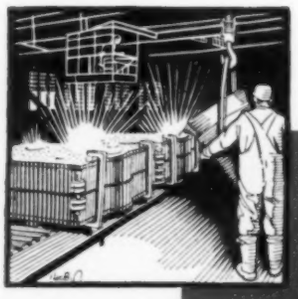

The Foundry

Volume 64 Number 4

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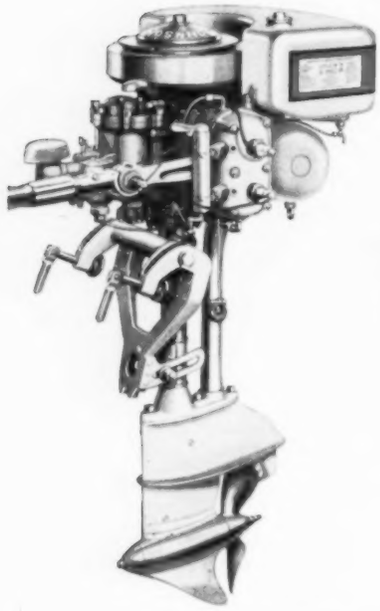
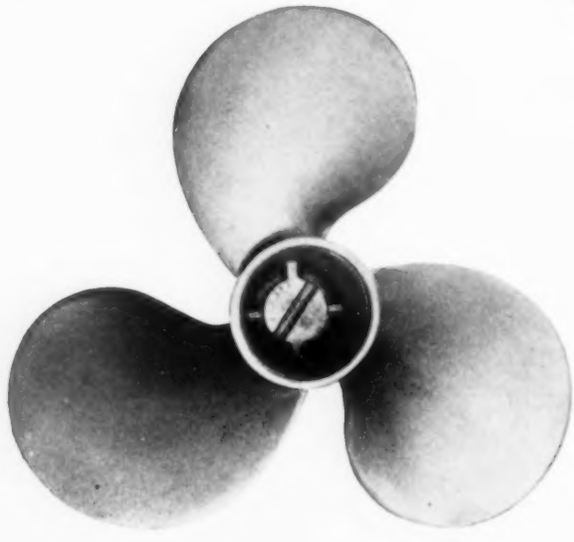
Out Where the Rule the Waves



LINOIL

Makes the Cores



Castings by

The United States Aluminum Company

Cleveland

THE WERNER G. S

Johnson Sea Horses

THERE is no better way of increasing foundry profits than by decreasing losses. That is plain common sense. Foundrymen who use Linoil have a lower cleaning cost, fewer gas ruined castings, decreased oven hourage, less core breakage, and a smaller ratio of oil to sand. Besides this there is the element of safety in Linoil, the assured uniformity. When time schedules must be met or expensive molds poured, this is important. Linoil is never a luxury, but always an economy. It is for this reason alone that Linoil holds the unchallenged first place in the foundry industry. Service men in seventeen cities.

Linoil Cored Cylinder Blocks for Johnson Outboard Motor Cast in Racine by
WISCONSIN CYLINDER FOUNDRY COMPANY

Make our Booth Your Headquarters
DETROIT, MAY 4th to 9th

SMITH COMPANY

CONTROLLED QUALITY OF PRODUCTS GUARANTEED BY

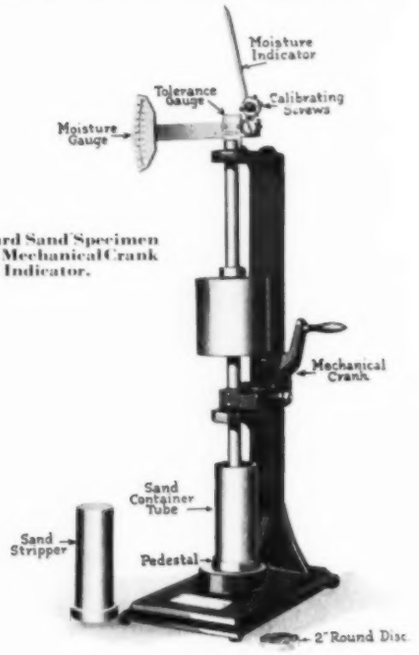
● Jerome, Wyo., Our Own Bentonite Mines and Plant - - - - - - - - - - - - - - - -

Used Moulding Sand Made *Uniformly New Every Time . . . .*

Sand Condition—No Longer Guesswork.

BY USING

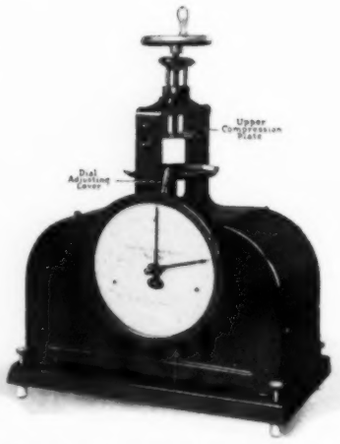
FEDERAL GREEN BOND



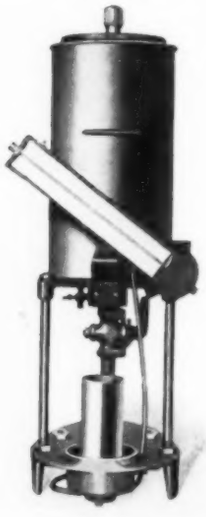
A.F.A. Standard Sand Specimen Rammer with Mechanical Crank and Moisture Indicator.

THE foundryman who uses this famous Bond makes a *double saving*. First, he uses the old sand over and over . . . Second, he saves the cost of new sand, its hauling, storage and disposal. He will even find the old sand *better* than the new with the use of Green Bond. Why? Vegetable matter is completely burned out. Bond strength is synthetically developed to suit individual foundry requirements and moisture is easily controlled.

From the mining to the final processing operation, Green Bond is laboratory controlled and certified. Submit your Bond problems . . . our service department will help you solve them.



Federal Sand Strength Machine No. 500 —Registers compression strength in pounds per square inch.



A.F.A. Standard Permeability Machine with Mercury Seal and DIRECT READING GAUGE.

THE FEDERAL FOUND

4600 E. 71st St.,

Factories: Cleveland, Chicago, Charleroi, Pa., Upton, Wyo. *Warehouses:* Detroit, Mich..

OWNERSHIP AND FACTORIES AT SOURCE OF RAW MATERIAL

Charleroi, Pa., Our Own Seacoal Mills

Here's the Famous Federal Twisted Stem Chaplet

Patented

This is the Chaplet foundrymen are talking about. It eliminates core shifts and welding caused by "leakers." This means money saved. The heads are electrically welded to the twisted stem making the chaplet one solid piece. Therefore, a *Federal* Chaplet will never cause a "leaker" or allow a core to shift. The Federal Chaplet will fuse quicker along entire stem length without prematurely "burning in." They're good—why?

THE TWIST DOES THE TRICK

It gives added lengths of four "knife-like" fusion edges yet no weakening deformation.

What's the "Riddle"? It's the greatest Sifter on the market!

With its Gyro-Vibratory motion concentrated at the screening surface, the Lowe Electric Riddle is the most efficient and economical Sifter for foundry sands and other granular materials.

It will screen a ton of oil bond sand every 4½ minutes and can be quickly moved from place to place.

It is equipped with a completely enclosed motor and has very few moving parts—it will last and give service indefinitely. It is the Riddle you should own.

SEACOAL FACING TO *SUIT* YOUR SAND *at a 20% saving!*

Our Charleroi Seacoal Facing is manufactured at our mills located at the mines in Charleroi, Pa. Only the highest grade Lump Gas Coal is used. This lump coal is very low in sulphur and ash and very high in volatile carbon. As this high volatile carbon is the essential element to peeling, it must not be destroyed during the processing of the coal. With our frictionless pulverizers, the high carbon content is not destroyed during grinding. The proof—jet-black facing, CHARLEROI SEACOAL.

These features plus uniform grinding and screening to the proper mesh size permits Charleroi Seacoal to mix so intimately with your sand that you actually use *20% less* and get cleaner castings.

Let us help with your problems. Give us the details of your work. We will then be glad to send you the required 'mesh size' CHARLEROI in any quantity on "Make Good" basis.

Remember—"Charleroi" costs no more.

We know how good it is. *You* find out by investigating this guaranteed product.

CHARLEROI SEACOAL

SEE SOME ACTION IN OUR BOOTHS AT THE DETROIT A. F. A. CONVENTION

RY SUPPLY COMPANY

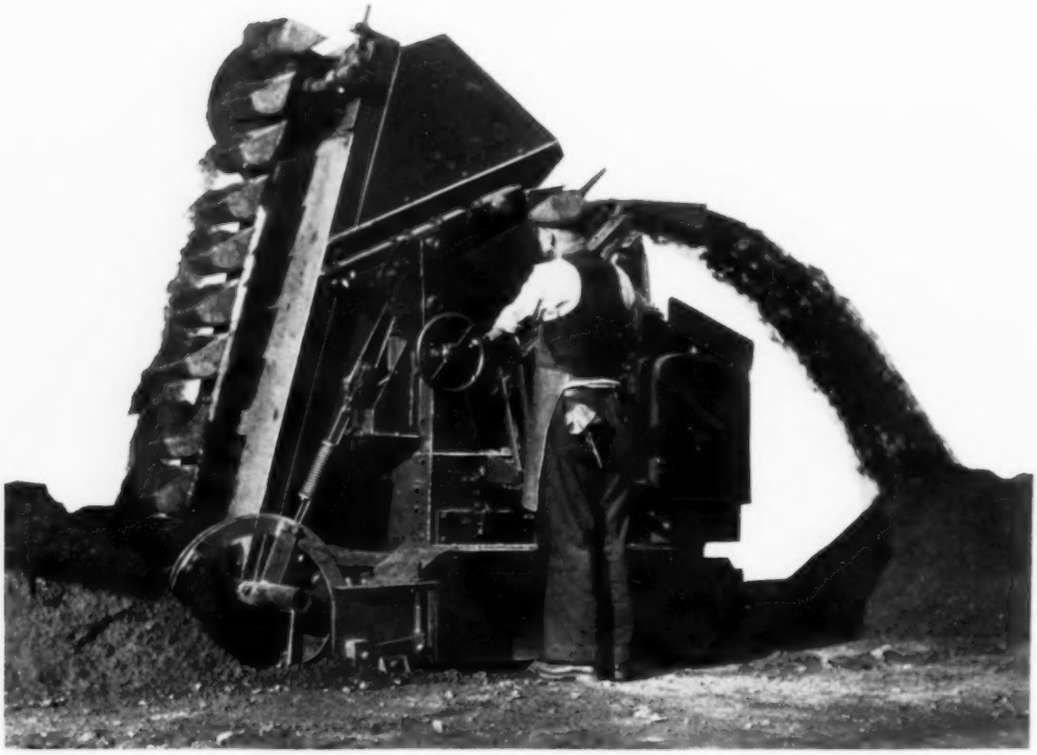
Cleveland, Ohio

Milwaukee, Wis., Minneapolis, Minn., St. Louis, Mo., New York Office—4179 Park Avenue

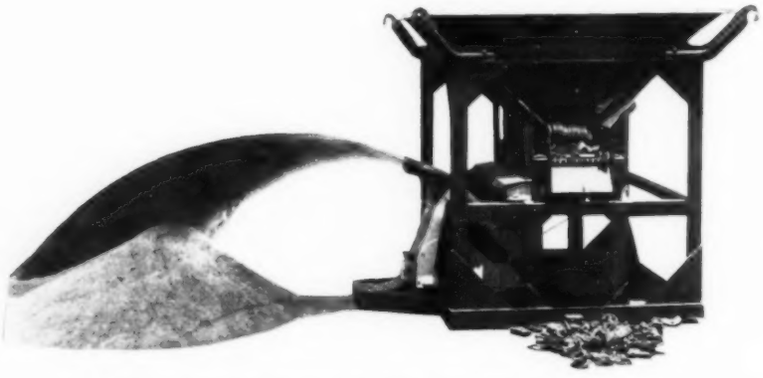
OPERATING AT DETROIT!

The ROYER

Self-Loading and Self-Propelled
Sand Separator and Blender



All visitors to the Foundry Convention at Detroit are cordially invited to visit our exhibit and watch these famous Royer machines in actual operation.



Royer Scrap Remover in combination with Royer Sand Separator and Blender.

Booths — 292-294-298-300-302 North Woodward Hall

ROYER FOUNDRY & MACHINE CO.

158 Pringle Street ROYER PRODUCTS RECOMMEND THEMSELVES **Kingston, Pa.**

Our laboratory, where materials are tested to maintain GREAT LAKES standard of quality and service, and through research to anticipate requirements of foundries in their effort to produce better castings.

Right—Work-a-day world in our offices.

Bonds of Friendship

"Business is business"—but business without joy, without the desire to create bonds of friendship based on mutual service is worthless. It cannot survive.

The persistent growth of our business since its inception in 1918 is due primarily to bonds of friendship founded on confidence. Confidence in quality of our materials, the prices at which they are sold and the complete service behind them.

At the A. F. A. Convention in Detroit, May 4 to 9, we anticipate the pleasure of greeting visiting foundrymen—our friends! Meet us at our exhibit, Booth 425, and before you leave the city come up to our offices and look us over—in the United Artists Building, just a step from the Statler.

Shoulders of Responsibility

It is our constant desire to further the long established policy of serving the customer—better!

John D. Cronenweth, Pres.
Wm. J. Muhlitner, V.P. & Gen'l. Mgr.
Neil I. McArthur, Sec'y. & Sales Mgr
Jas. G. Mendenhall, Treas.
S. H. Cleland, Mgr. CoroiL Dept.
Chas. L. Cruikshank, Mgr. Ceramic Dept.
H. P. Mackinnon, Sand Blast Engineer
Fred L. Weaver, Metallurgist
John L. Jones, Foundry Service
John E. Whalen, Coreroom Service
H. D. Farris, Sales

Molding Sands
Bank Core Sands
Lake Core Sands
Crude Silica Sands
Ottawa Silica Sands
Silica Flour
Great Lakes CoroiL
Bentonite
Clay Bond
Fire Brick
Nepheline Syenite
Refracto Fire Clays
Refracto Firestone
Mica Schist
Ganister-Silica Grits
A B C Foundry Coke

Great Lakes Foundry Sand Co.

NOW IN UNITED ARTISTS BUILDING

Detroit, Michigan

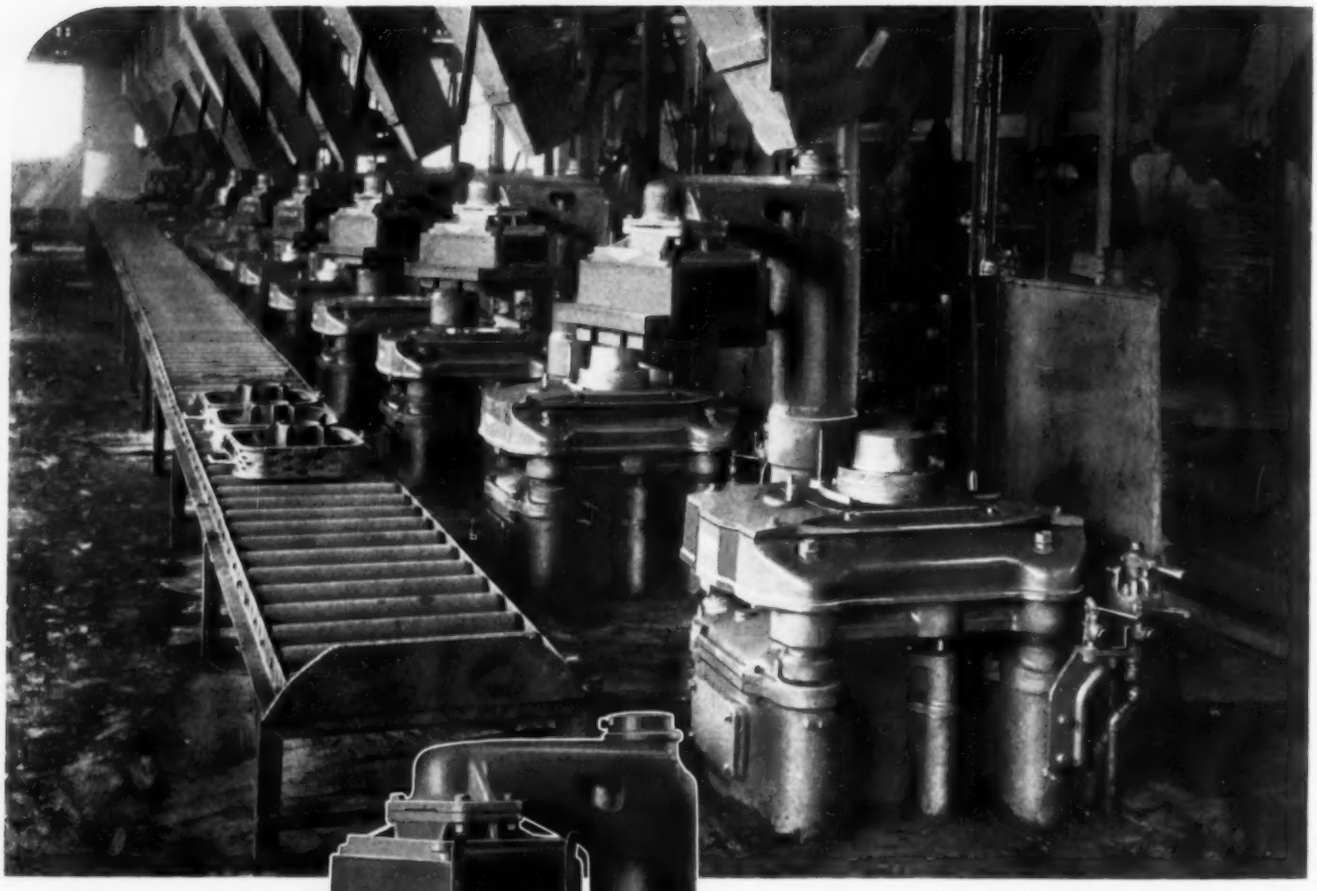
Foundry, Metallurgical and Sand Blast Engineering Service

BLAST SANDS

Diamond
Flint Shot
Gem Quartz
Muscatine
Gold Jacket

Steel and Metallic Abrasives
Alloy Iron Nozzles
Stoody Borium Nozzles
Mill Stars
Limestone
Dolomite

OSBORN



Osborn Jolt Squeeze Strippers produce both cope and drag moulds for passenger car brake drum castings in the foundry of the Budd Wheel Corporation, Detroit, Mich.

We Invite You to Visit Our

EXHIBIT

at the A. F. A. Convention Detroit, Mich. May 4th to 9th

Booth Nos. 506-507-508 509-510-537-539-541

EQUIPPED

FOR MASS PRODUCTION OF HIGH QUALITY MOULDS

BATTERIES of Osborn Moulding Machines maintain a continuous flow of uniform high-quality moulds in this new high production foundry.

Smooth co-ordination of moulding, pouring and shake-out operations is made possible by the dependable performance of these heavy duty, high-speed moulding machines engineered by Osborn to meet the exacting requirements of modern foundry practice.

Osborn Engineers will be glad to help you in the proper selection of Osborn moulding equipment for your foundry.

THE OSBORN MANUFACTURING COMPANY

5401 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Agencies strategically located throughout the world

Moulds for truck brake drum castings are produced by Osborn machines working in pairs. The copes are made on Jolt Squeeze Strippers. The drags are made on Jolt Rollover Squeeze Machines.

Molding Sand is still the most important factor in making castings

Therefore—do you know

. . . That Ayers Mineral supplies more than THIRTY GRADES AND BLENDS of Molding Sand.

. . . That Ayers Mineral is the ORIGINAL Certified Molding Sand that squarely meets every foundry condition and absolutely assures uniformity.

. . . That Ayers Mineral can supply a sand that will exactly meet your requirements, no matter what those requirements may be.

. . . That Ayers Mineral Certified Sands will save you money — both save it and make it for you — and will give you better castings.

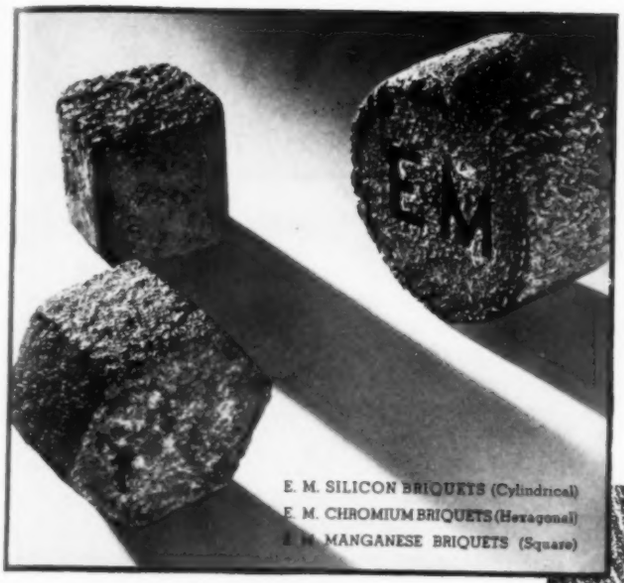
. . . That Ayers sand has been the leader since 1884.

Make our booth your headquarters while at the convention in Detroit.

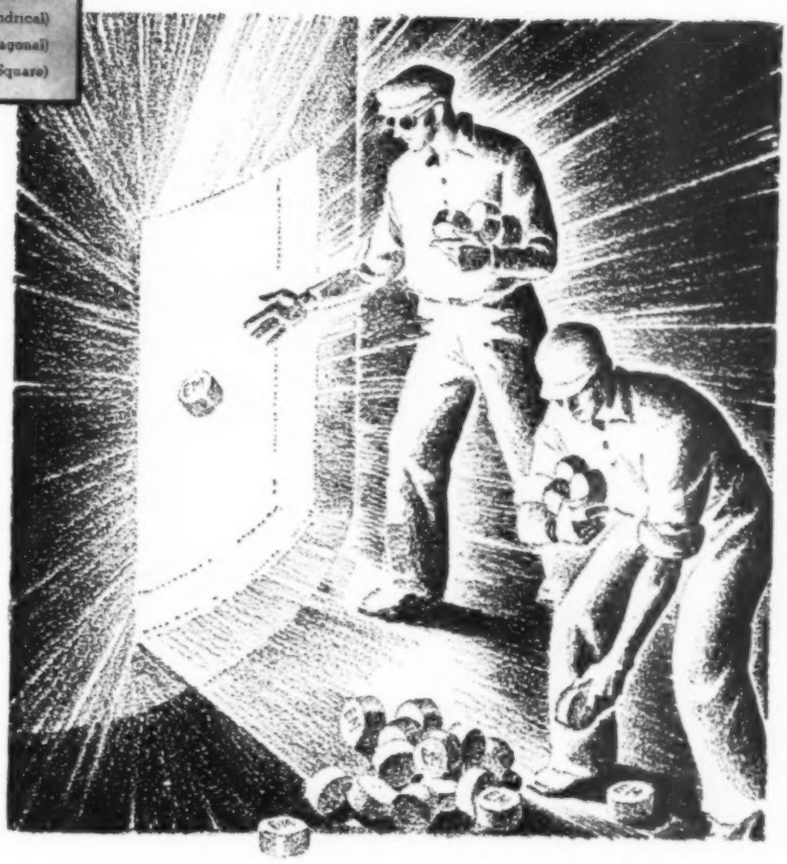
AYERS MINERAL CO. · *Zanesville, Ohio*

AYERS *CERTIFIED* SANDS

You know a foundryman who uses Ayers Certified Sands.
Ask him about them. Or, better still, ask us.



Briquetted Alloys *are convenient*



BRIQUETTED alloys provide a simple and convenient method of adding ferro-alloys to cupola charges. In the briquetted form, alloys are easy to handle. Correct additions are readily calculated and made.

E. M. Briquets are of specific sizes and contain exact weights of the alloying elements. It is necessary merely to count out the correct number of briquets and add them to the charge. Weighing is eliminated. Uniformity and flexibility of control are obtained.

E. M. Briquets are protected from oxidation by a refractory binder until they reach the melting zone of the cupola. Thus a high recovery (better than 90 per cent) of the alloying element is obtained and off-iron is avoided. Iron of uniform physical and chemical composition is the result.

Let Electromet Engineers show you how you can use E. M. Briquets to your advantage. Write today for complete information.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

CARBIDE and CARBON BUILDING
30 EAST 42nd STREET • NEW YORK, N. Y.

Electromet
Ferro-Alloys & Metals

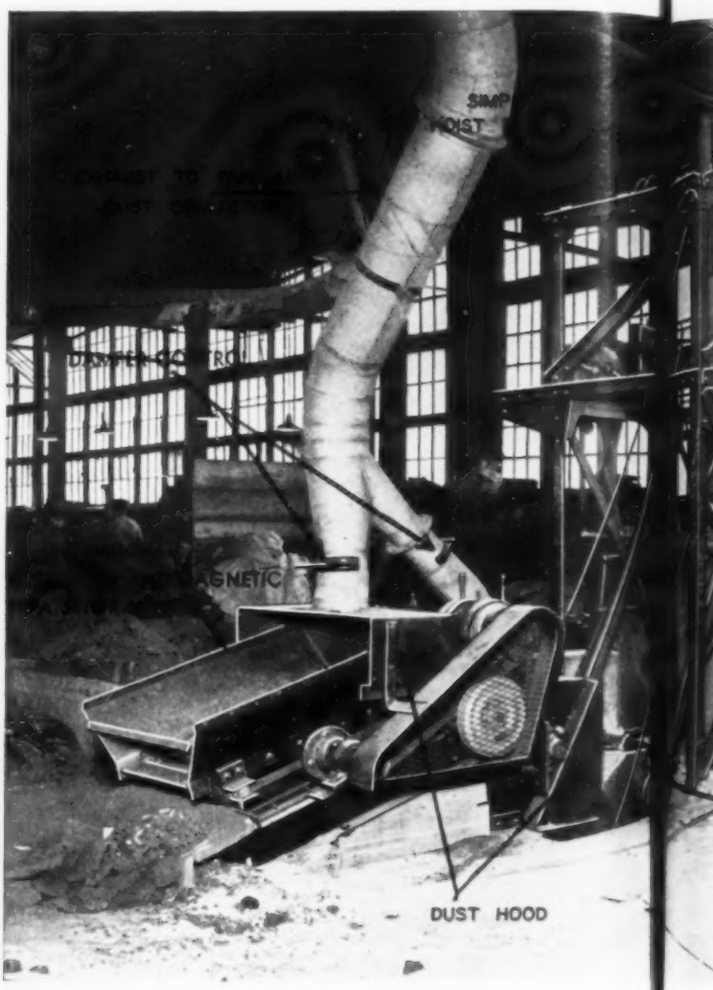
SAND PREPARING, SAND RE

DEMONSTRATED — BOOTHS NO. 251-7 INCL.

COMPLETE OPERATING UNIT!

consisting of

1. National Screening and Magnetic Separator.
2. Simpson Skip Hoist Bucket Loader.
3. Latest Design No. 2 Model "H", 6' Diameter Pan Simpson Intensive Sand Mixer.
4. National Aerator, attached to the discharge of the Simpson Mixer.
5. Hoods and Housings, with Piping and Damper Control to Fan and Dust Collector.
6. Operating platform and controls, duplicating complete production set-up.
7. The equipment will be operated at suitable intervals throughout the period of the Convention under full load, reclaiming and properly preparing foundry sands.
8. This exhibit unit sold, as shown, for installation at Union Metal Mfg. Co., Canton, Ohio.



Latest Design No. 2 Mod. "H" Simpson Mixer, showing off-set muller and plow arrangement.

THE No. 2 MOD. "H" SIMPSON MIXER

used in the above unit, offers the maximum of efficiency and economy for the preparation of all classes of foundry sand. The latest design machines are equipped with valuable new features, most of which are applicable to Simpson Mixers now in use, including anti-friction bearings and cut steel gearing operating in oil, new style plow and muller arrangement, etc.

WE CORDIALLY INVITE YOU TO VISIT WITH US MODERN SAND PREPARING, RECLAIMING AND

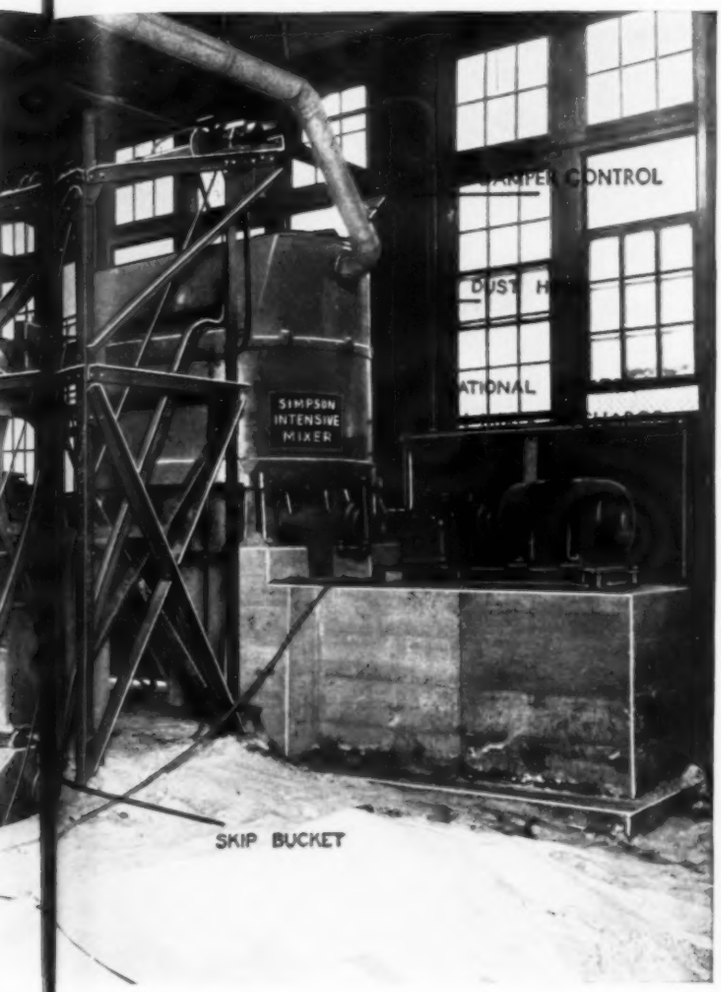
NATIONAL ENGIN

549 W. Washington Blvd.,

MANUFACTURING AND SELLING AGENTS: FOR CANADA — DOMINION ENGINEERING WKS., LTD., MONTREAL, P. Q.

CLAIMING, SAND CONTROL!

A. F. A. CONVENTION, DETROIT, MAY 4th TO 9th



SKIP BUCKET

THIS UNIT PROVIDES

all of the functions of a complete sand handling system by means of simple elements, auxiliary to the Simpson Intensive Mixer, such as the foundry of moderate capacity may install, including:

1. Screening of the sand.
2. Removal of metallic scrap.
3. Removal of dust and fines.
4. Proper mulling of the sand.
5. Aeration of the prepared sand as discharged from the Simpson Mixer.
6. Unit operated under conditions free of dust.

Cleaned sand, properly mulled and aerated, assures smooth, sound castings held closely to tolerances and weights, at lowest production cost. Check with us on major cost-reducing factors.

IN ADDITION, WE WILL SHOW

the latest design No. 3—8' Dia. Pan Simpson Intensive Mixer, equipped with double discharge, air operated. This machine, as shown, is used in modern continuous sand handling systems for the proper preparation, by mulling, of all of the sand in the system each time it is used. Continuous flow of the sand is provided, yet with batch control of uniformity.

Latest Design No. 3 Simpson Mixer, showing water funnel, crib fillet, etc.

AT DETROIT TO DISCUSS THE APPLICATION OF CONTROL EQUIPMENT FOR YOUR PARTICULAR FOUNDRY.

EERING COMPANY

Chicago, Illinois, U. S. A.

FOR CONTINENTAL EUROPEAN COUNTRIES—THE GEORGE FISCHER STEEL & IRON WKS., SCHAFFHAUSEN, SWITZERLAND

Stoney Knockout Machines

Medium Size Machines removing cores from a Transmission Case in a large tractor plant in 10 seconds.

Built In Sizes And Types To Suit
All Requirements

The Stoney

Foundry Engineering & Equipment Co.

5321 St. Clair Avenue Cleveland, Ohio

Getting down to FACTS
with
BUCKEYE SILICA FIRESTONE

Excerpt from Service Report on a Recent Test in a Large Automobile Plant Using 3 Dimension Hand Cut Cupola Blocks:

The melting zone was cleaned out to the shell which measured 90". A one inch backing of Buckeye Silica Firesand and fireclay in the proportion of 60% sand and 40% clay was used. A very plastic Oakhill, Ohio clay was used. This was made up into a thick mortar. The 4" blocks were then placed against this one inch backing and thick fireclay mortar was used between all joints which were about ¼" wide. The 4" row of block was carried above the tuyeres to about 42," then the 7" block was placed in the cupola, using the same fireclay mortar with ¼" joints.

The fire was lighted about two hours before the iron was tapped out. They ran a continuous heat for 24½ hours. At the end of this time they showed approximately 1" wear to every 4 hrs. run, or in other words, about 6" of the 7" block was worn away. This is something they have never been able to do with fireclay block. Their heats formerly ran 12 hrs. and in 12 hrs. consumed a 6" brick and if they ran 16 hrs. they would consume two rows of brick or about 10".

They have been able to effect the following saving:

1. They use one half as much stone as firebrick.
2. They have eliminated 8 to 10 hrs. labor of 5 men on each cupola as they only reline once every 24 hrs. in place of every 12 hrs.
3. They have eliminated 1 coke bed that will approximate 2 tons.
4. They have eliminated the use of two slag hole blocks by running 24 hrs. instead of 12 hrs.
5. They have eliminated about 2500 lbs. of molding sand for their bottoms.
6. They have melted 30 tons of iron more in 24 hrs. per cupola than formerly.
7. The iron has been hotter in general over the 24 hr. period than running two 12 hr. heats.
8. The savings in dollars and cents by eliminating labor, coke, cost of brick over stone is approx. $98.00 a day on one cupola.

● Above—North side of Number 6 quarry of The Cleveland Quarries Co., at Amherst, Ohio . . . largest quarry in the world.

● In circle — Hand Cut Cupola Blocks of Buckeye Silica Firestone. Aid in the scientific control of melting zone — cut operating costs, help to produce cleaner, better iron.

You can effect savings in proportion in your cupolas by using Buckeye Silica Firestone.

Don't fail to visit our exhibit at the American Foundrymen's Convention at Detroit, May 4-9, 1936.

1886 — GOLDEN JUBILEE — 1936

THE CLEVELAND QUARRIES CO.

REFRACTORIES DIVISION • BUILDERS EXCHANGE BUILDING • CLEVELAND, OHIO

THE AIRLESS ROTOBLAST

THIS YEAR'S FOUNDRY SENSATION BECAUSE

it has revolutionized

BLAST CLEANING COSTS!

- **47** PANGBORN AIRLESS ROTOBLASTS are in use to date. These include many special cleaning machines designed to handle odd shaped large and small castings in many various manufacturing fields. Modern Industry has endorsed the Pangborn ROTOBLAST. It cleans faster, better and cheaper. It eliminates air. It eliminates dust nuisances. It is the modern PACEMAKER that increases PROFITS.

A FEW OF THE MANY SPECIAL

Let Pangborn Engineers suggest

CLEANING METER BOXES

CLEANING FLY WHEELS

PANGBORN

BY THE WORLD'S LARGEST MANUFACTURERS

PANGBORN CORPORATION

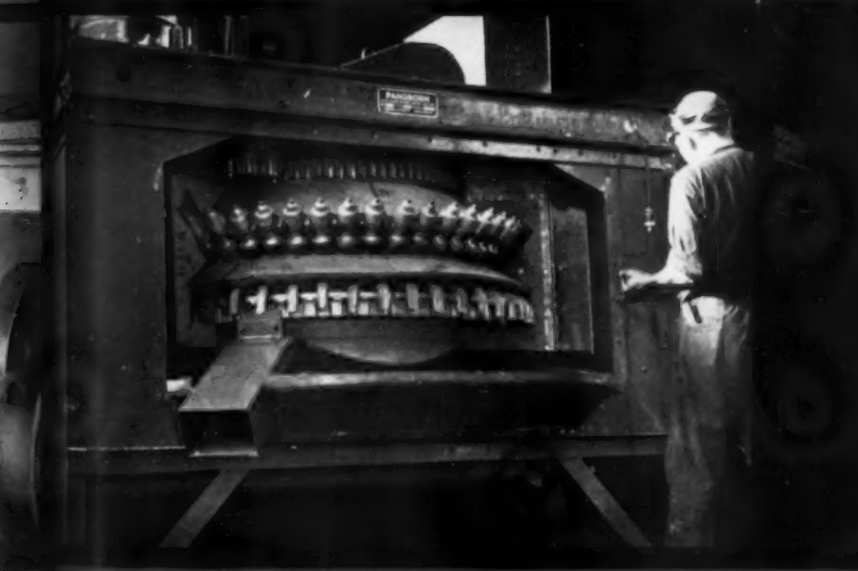
The ROTOBLAST quickly and economically cleans GRAY IRON; MALLEABLE AND STEEL CASTINGS; HEAT TREATED PARTS, etc.

AT DETROIT

● Be sure to attend the FOUNDRY AND ALLIED INDUSTRIES EXPOSITION -- MAY 4, 5, 6, 7, 8, 9. PANGBORN will have the largest exhibit ever displayed. More than three car loads of new equipment will be in operation.

L ROTOBLAST CLEANING MACHINES

ype for your work. Write us today.



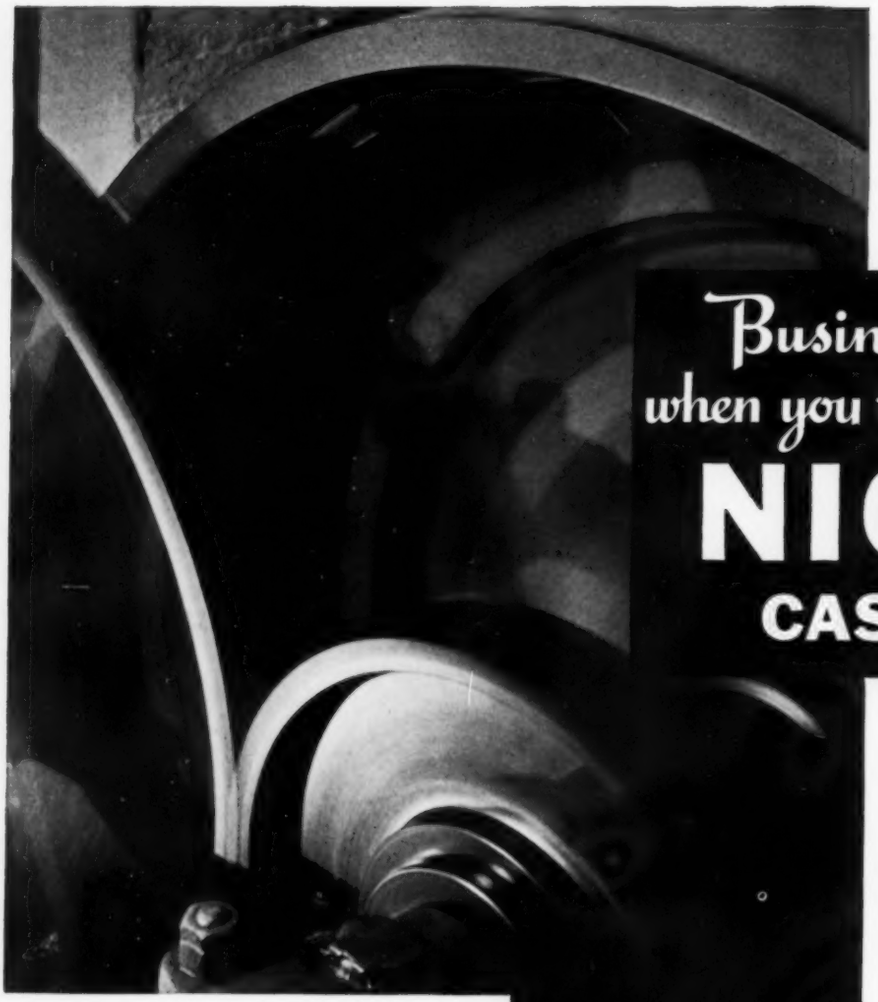
CLEANING PISTONS

CLEANING CYLINDER BLOCKS

ROTOBLAST

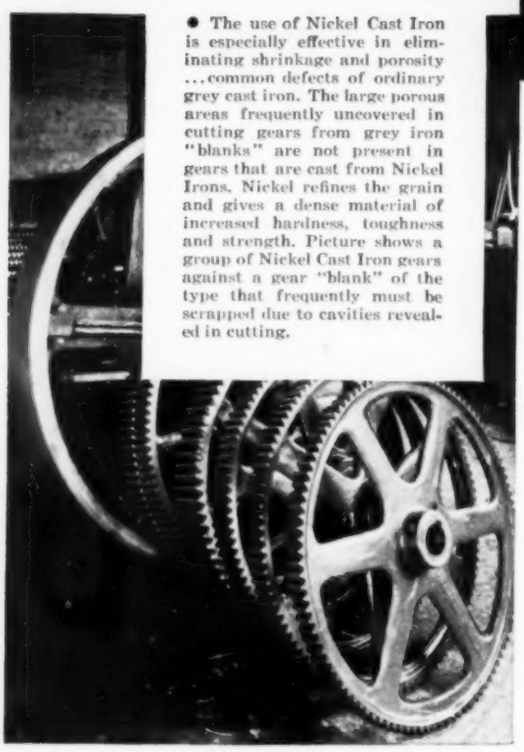
O AST CLEANING AND DUST COLLECTING EQUIPMENT

HAGERSTOWN, MARYLAND



Business Hums when you turn out gears of NICKEL CAST IRONS

● Machinery users are constantly in the market for gears of superior wear-resistance. Foundries which are producing gears of strong, hard, tough Nickel Cast Iron find that the dependability and long life of this material brings in a constant stream of new and profitable business.



● The use of Nickel Cast Iron is especially effective in eliminating shrinkage and porosity ...common defects of ordinary grey cast iron. The large porous areas frequently uncovered in cutting gears from grey iron "blanks" are not present in gears that are cast from Nickel Irons. Nickel refines the grain and gives a dense material of increased hardness, toughness and strength. Picture shows a group of Nickel Cast Iron gears against a gear "blank" of the type that frequently must be scrapped due to cavities revealed in cutting.

● Gears of every type and size may be produced with Nickel Cast Iron. Its higher hardness, increased strength and toughness, all contribute to longer and more satisfactory performance. In addition Nickel improves machinability by eliminating hard spots. The saving in machining costs plus lower scrap losses far more than offset the higher initial cost of using Nickel. Our casting specialists are always at your service to recommend compositions and the best modern practises.

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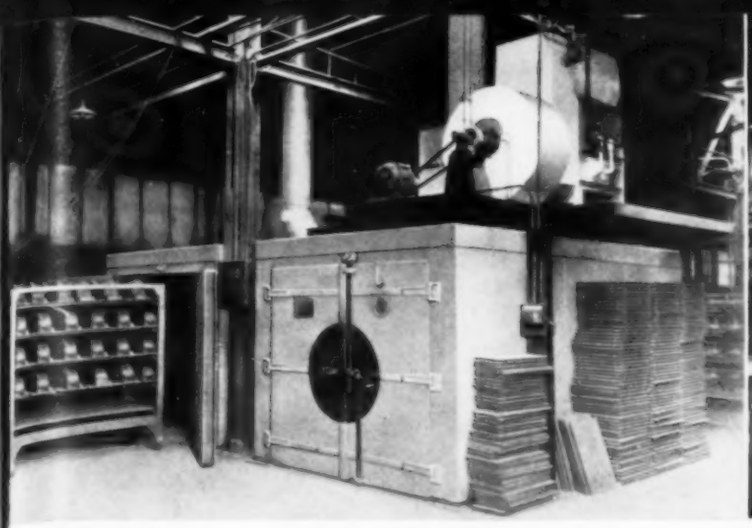


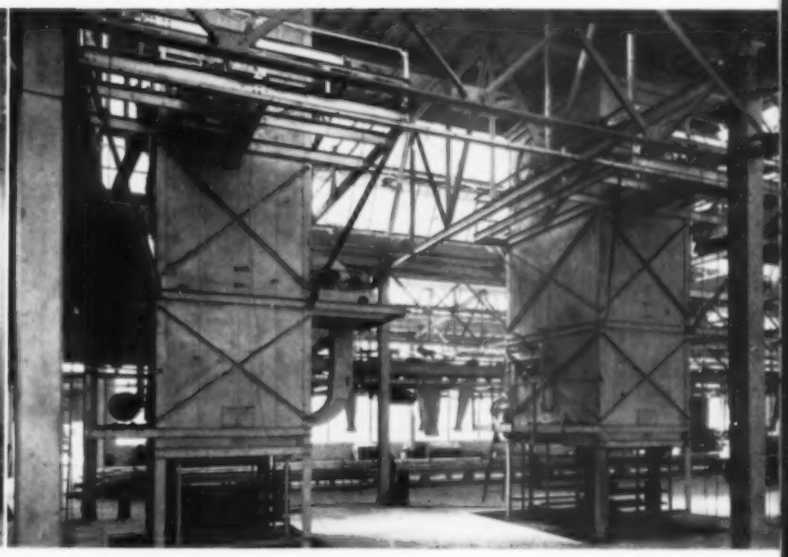
Coleman Rack Type Ovens

Coleman Car Type Ovens

Coleman Ovens

Coleman Rolling Drawer Type Ovens

Coleman Vertical Conveyor Core Ovens



GOOD CASTINGS demand good cores! Coleman Ovens assure a dependable production of uniformly good cores at lowest cost for fuel and labor.

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The Foundry

for April

Plenty of Doggling —No Boon

THERE is just as much doggling in the foundry business as there is in the present government foolishness—or isn't there? If you watch almost any WPA job, 70 to 90 per cent of the "workers" will be doggling. Their pay, derived from your taxes, is a boon to them. But to you?

Foundries have gone along for years without planned activity for the advancement of their business interests; without any effective concerted program for creating new business; just living on orders from week to week. Dividends, (if any), salaries and wages, are a boon to foundrymen. Not discounting the technical and scientific work which has been done collectively, how much of a boon can such progress be to the owners of foundries if it remains like natural resources, oil, gold, or diamonds, hidden underground?

Should and can the foundry business, like WPA workers, live from hand-to-mouth and day-to-day, or like politicians, from term-to-term? From whom can the foundry industry collect taxes with which to feed itself?

If any foundry executive was paid a salary of $15,000 or more, whether earned or not, the fact probably has been published in his local papers.

Snoopers from Dakota, Montana and Georgia, where there are practically no industries, invent new and more noxious stench bombs for business. Has business, or has the foundry business, formulated any constructive program to get itself off the spot? Has American industry, or the foundry part of it, any plan to suggest for re-employment, balanced budgets, revival of foreign trade, research, new products or markets? Would the foundry business regard it as a part of its immediate problem to try to find solutions for any of the tremendous problems which confront all American industry?

While the A.F.A. is a technical organization, may not the time of the national convention next month afford opportunity for those executives in the industry who are interested and will take time, to give some thought to these problems, which have not yet received constructive study, so far as we know, from any organized group of American business men. Should we condemn the doggling by senators, representatives and bureaucrats while our own industry doggles?

Unless American industry is willing to work for the boon which solution of such problems would bring upon America, why should it not turn over the country to the dogglers? While politicians and demagogues put industry, corporation salaries, private incomes, and private business on the spot, why should not industry demand a hot spotlight on the incomes of all public servants; on the salaries of RFC managers of banks and industries; on the bonuses for hog murder and crop birth control? Or more constructively, why should not business formulate some sensible program for the cure and correction of these tremendous problems?

Are you interested?

Out of the Flood

FROM Pittsburgh comes a clipping of an advertisement published a few days after the flood crest passed. The A. W. Cadman Mfg. Co., oldest brass and bronze foundry in the city offers plaques recording the catastrophe. These are lettered, "All time high flood stage—46.7 feet, March 18, 1936, Pittsburgh, Pa." They are offered in styles and sizes ranging in price from $7 to $25. This is enterprise, unquenched by disaster. To A. M. Cadman member of the firm, congratulations on salesmanship.

Editor

DETROIT CHAPTER FOR FORTIETH ANNUAL

Scenes in Detroit. Top from left to right—Washington boulevard from Grand Circus park. Entrance to Convention hall. Edison Institute at Greenfield Village. Left—Fisher building. Institute of Arts. Bottom — Detroit-Leland hotel

TO DETROIT, the motor capital of the world, again goes the honor of entertaining the annual convention and exhibition of the American Foundrymen's association on a major anniversary of the founding of that most important force in the progress of the foundry industry. As in 1926, when the International Foundry congress at the Michigan metropolis marked thirty years of useful and active service of that organization to the development of foundry practices, the Foundry and Allied Industries exposition and the annual convention, to be held in Detroit from May 4 to 9, not only celebrates the fortieth anniversary of the association but also records a decade of achievement unique in the life of technical societies.

It is interesting to turn back the pages of THE FOUNDRY ten years and note the following tribute and prophesy published in

PREPARES WELCOME CONVENTION OF A. F. A.

By FRANK G. STEINEBACH

Top from left to right—Campus Martius with City hall in foreground. Book-Cadillac hotel. Financial center of Detroit. Right—General Motors building. Statler hotel. Bottom—Martha and Mary Chapel in the Ford Greenfield Village

connection with the previous Detroit convention and exhibition:

"Conceived of the yearning of foundrymen for greater knowledge of their art, born of the tireless striving of the pioneers of the nineties, nurtured with the kindly spirit of *give that ye may receive,* it has grown to the age which marks maturity in mankind. Here the comparison must end. The American Foundrymen's association sprang into useful activity with its earliest existence. Its powers have developed and its accomplishments have broadened with increasing years; and unlimited by the dimming perceptions which come to all mankind, the American Foundrymen's association will continue to grow, to serve and to advance the industry."

How well this prophesy has been fulfilled. In a period fraught with strife, uncertainty and disappointment sufficient to test to the utmost the foundations of all institutions, the American Foundry-

men's association has continued to grow; to point the way for greater progress in the foundry industry of North America. To the early founders, who builded well, and to the association leaders, who year after year so ably have guided the destinies of the organization, the pinnacle of achievement upon occasion of the fortieth anniversary celebration provides a lasting memorial.

The Detroit convention of 1936 will make available much of interest and great value to every man connected in any way with the foundry industry. The Foundry and Allied Industries

TENTATIVE PROGRAM

Monday, May 4

Registration—Convention Hall
Plant Visitation

Tuesday, May 5

9:00 a.m.—*Registration—Convention Hall*

9:00 a.m. to 6:00 p.m.—*Exhibits Open—Convention Hall*

9:00 a.m.—*Cast Iron Shop Course* (Session 1)

Chairman—P. T. Bancroft, Moline, Ill.; discussion leader, E. J. Carmody, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
Cupola Operation and Repair.

10:00 a.m.—*Opening Meeting—Fortieth Annual Convention*

Address of Welcome—Harvey Campbell, Detroit Board of Commerce.
Announcements.
President's Annual Address—Dan M. Avey, THE FOUNDRY, Cleveland.

11:00 a.m.—*Nonferrous Casting Practice*

Chairman—Jerome Strauss, Vanadium Corp. of America, Bridgeville, Pa.
Manganese Bronzes, by Dr. F. R. Hensel, P. R. Mallory Co., Indianapolis.
Pressure Castings in Aluminum Bronzes, by H. T. Ganzauge, Goulds Pumps Inc. Seneca Falls, N. Y.
Annual Business Session, Nonferrous Division.
Report of Election of Officers.
Report of Committee on Recommended Procedure for the Analysis of Defects.

11:00 a.m.—*Malleable Cast Iron*

Chairman—P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.
Malleable Sand Control, by H. W. Dietert and F. Valtier, H. W. Dietert Co., Detroit.
Report of Committee on Specifications.

11:00 a.m.—*Annual Meeting—Gray Iron Founders' Society, Hotel Statler*

12:30 p.m.—*Luncheon and Round Table Discussion—Engineering Instructors*

Chairman—C. J. Freund—Dean of Engineering, University of Detroit.

2:00 p.m.—*Sand Research*

Chairman—R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston; vice chairman, W. G. Reichert, Singer Mfg. Co., Elizabeth, N. J.
Constitution of Bonding Clays and Its Influence on Bond Properties, by R. E. Grim, R. H. Bray, and W. F. Bradley, Illinois State Geological survey, Urbana, Ill.
Deformation of Molding Sand, by H. W. Dietert and R. A. Dietert, H. W. Dietert Co., Detroit.
Practical Sand Control in Gray Iron Foundries, by H. Deane, Deere & Co., Moline, Ill.
Foundry Sand Testing Problems at High Temperatures, by P. E. Kyle, Massachusetts Institute of Technology, Boston.
Committee Reports.

4:00 p.m.—*Sand Control Shop Course* (Session 1)

7:00 p.m.—*Joint Dinner and Smoker*—Foundry Equipment Manufacturers' Association, American Foundrymen's Association and Detroit Chapter of A. F. A.

Wednesday, May 6

9:00 a.m. to 6:00 p.m.—*Exhibits Open*

9:00 a.m.—*Cast Iron Shop Course* (Session 2)

Chairman—K. H. Priestley, Eaton-Erb Foundry Co., Vassar, Mich.; discussion leader, Fred J. Walls, International Nickel Co., New York.
Fundamentals of Welding Cast Iron.

10:00 a.m.—*Cast Iron*

Chairman—M. Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; vice chairman, V. A. Crosby, Climax Molybdenum Co., Detroit.
Control of Manganese in the Cupola, by M. T. Davies III, General Electric Co., Ontario, Calif.
Determining the Height of Molten Metal in the Cupola, by Carl Harmon, Chevrolet Gray Iron Foundry Co., Saginaw, Mich.
Effect of Coke Below Tuyeres, by H. Johnson and James T. MacKenzie, American Cast Iron Pipe Co., Birmingham.
Developments of Blast Cleaning in the Foundry, by C. A. Reams, Ford Motor Co., Dearborn, Mich.

10:00 a.m.—*Malleable Cast Iron*

Chairman—F. L. Wolf, Ohio Brass Co., Mansfield, O.; vice chairman, L. N. Shannon, Stockham Pipe & Fittings Co., Birmingham.
Measuring and Controlling Pouring Temperatures, by C. F. Joseph, Saginaw Malleable Iron division, General Motors Co., Saginaw, Mich.
Metallographic Changes During Cooling Between First and Second Stages of Annealing, by H. A. Schwartz and C. H. Junge, National Malleable & Steel Castings Co., Cleveland.
Selection of Melting Furnaces for Malleable Iron, by M. G. Girshovitch and H. F. Landa, Central Institute of Scientific Research for Machine Construction, U. S. S. R.

12:30 p.m.—*Luncheon and Round Table Discussion—Nonferrous Division*

Chairman—T. C. Watts, Falcon Bronze Co., Youngstown, O.; vice chairmen: H. J. Rowe, Aluminum Co. of America, Cleveland; and Harold J. Roast, Canadian Bronze Co., Montreal, P. Q.
Topics for discussion:
1. Melting Practice.
   (a) Furnace Atmosphere.
   (b) Furnace Operation.
2. Insulation of Furnaces.
3. Relation Between Deoxidizer's Content, Gates, Risers, Pouring Temperatures, Shrinkage and Sand Attack.
4. Questions on Papers on Bronzes Read at Convention.
5. Cast Metals Handbook.

2:00 p.m.—*Apprentice Training*

Chairman—S. Wells Utley, Detroit Steel Casting Co., Detroit.
Apprentice Training in Detroit Industries, by H. W. Boulton, Murray Corp., Detroit.
Foundry Apprentice Training, by Franklin R. Hoadley, Farrel-Birmingham Co., Ansonia, Conn.
Training Foundry Apprentices in Cleveland, by J. G. Goldie, Cleveland Vocational School, Cleveland.

3:30 p.m.—*A.F.A. Cost Committee*

4:00 p.m.—*Sand Control Shop Course* (Session 2)

Exposition, the largest show of its kind to be held in recent years, will reveal the enormous development which has been made in the invention and perfection of equipment and supplies during the past few years. The technical sessions covering all branches of castings manufacture will bring together the best minds of the industry to discuss practical and technical problems related to foundry practice and closely allied subjects. Almost unlimited facilities for plant visitation are available in Detroit, where the casting of metals (*Continued on page 37*)

FOR DETROIT MEETING

8:00 p.m.—*Foundry Refractories*

Chairman—C. E. Bales, Ironton Firebrick Co., Ironton, O.; vice chairman, A. H. Dierker, Engineering Experiment Station, Ohio State University, Columbus, O.
Behavior of Cupola Refractories Under Severe Operating Conditions, by J. L. Lowe, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
Notes on Some Foundry Refractories, by J. D. Sullivan, Battelle Memorial Institute, Columbus, O.
Overcoming Spout Trouble by Use of a Monolithic Refractory Tile Trough, by J. A. Bowers, American Cast Iron Pipe Co., and Charles Green, Alabama Clay Products Co., Birmingham.
Open Forum—Insulated Ladles.
Question Box:
(1) Is it possible to reduce silicon from sandstone used in the melting zone of a cupola?
(2) Is it possible to reduce titanium from blocks used in the melting zone of a cupola?
(3) Do fire clay shapes give better service than silica brick in some electric furnace roofs?
(4) Which is best, a fire brick bottom or a silica sand bottom, in malleable iron furnaces?
(5) What is the best type refractory for the rotary powdered coal-fired type furnace?

8:00 p.m.—*Steel Founding*

Chairman—John Howe Hall, Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Cleaning Steel Castings, by Paul Dougher, American Steel Foundries, East Chicago, Ind.
Factors in the Scaling of Steel Castings on Heat Treating, by F. J. Ryan, R-S Products Corp., Philadelphia.
Removing Gates and Risers by Gas Cutting, by F. H. Andrews, Phillips Petroleum Co., Philadelphia.
Report of Representative on A. S. T. M. Committee on Specifications.

8:00 p.m.—*Conference of chapter officers*

Thursday, May 7

9:00 a.m. to 6:00 p.m.—*Exhibits Open—Convention Hall*

9:00 a.m.—*Cast Iron Shop Course* (Session 3)

Chairman—Leslie G. Korte, Atlas Foundry Co., Detroit; discussion leader, G. P. Phillips, International Harvester Co., Chicago.
Alloys—Why Used and What They Do to Cast Iron.

10:00 a.m.—*Cast Iron*

Chairman—Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham; vice chairman, E. K. Smith, Electro Metallurgical Corp., Detroit.
Notes on Fatigue Properties of Alloy Cast Irons, by H. L. Daasch, Iowa State College, Ames, Iowa.
Heat Treated Cast Iron, by M. Ballay and R. Chavy, Paris, France. Exchange paper of the French Foundry Technical Association.
Heat Treatment by Hardening and Tempering, by J. E. Hurst, president, Institute of British Foundrymen. Exchange paper of the Institute of British Foundryman.

10:00 a.m.—*Nonferrous Castings*

Chairman—H. M. St. John, Detroit Lubricator Co., Detroit; vice chairman, T. E. Kihlgren, International Nickel Co., Bayonne, N. J.
Sand Castings of the Copper Silicon Alloys, by H. A. Bedworth, and V. P. Weaver, American Brass Co., Waterbury, Conn.
Foundry Aluminum Bronzes, by J. E. Crown, Naval Gun Factory, Washington.
Report of Committee on Recommended Practices.

12:30 p.m.—*Luncheon and Round Table Discussion—Steel Division*

Chairman—A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn.

12:30 p.m.—*Luncheon and Round Table Discussion—Malleable Division*

Chairman—R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich.

3:30 p.m.—*Annual Business Meeting*

4:00 p.m.—*Sand Control Shop Course* (Session 3)

7:00 p.m.—*A.F.A. Annual Dinner—Speaker, W. J. Cameron, Ford Motor Co., Dearborn, Mich.*

Friday, May 8

9:00 a.m. to 6:00 p.m.—*Exhibits Open—Convention Hall*

9:00 a.m.—*Cast Iron Shop Course* (Session 4)

Chairman—John Grennan, University of Michigan, Ann Arbor, Mich.; discussion leader, James H. Lansing, Kelsey-Hayes Wheel Corp., Detroit.
Use of Pulverized Coal-Fired Rotary Furnace in Melting Cast Iron.

10:00 a.m.—*Steel Founding*

Chairman—R. A. Bull, Chicago; vice chairman, Marshall Post, Birdsboro Steel Foundry Co., Birdsboro, Pa.
Free and Hindered Contraction of Alloy Steel Castings, by C. W. Briggs, and R. A. Gezelius, Naval Research Laboratory, Washington.
Report of Committee on Test Coupons.
Report of Committee on Radiography.
Report of Committee on Methods of Manufacture of Liquid Steel for Castings.
Report of Representative on Committee on Foundry Sand Research.

10:00 a.m.—*Cast Iron*

Chairman—H. Bornstein, Deere & Co., Moline, Ill.; vice chairman, A. L. Boegehold, General Motors Corp., Detroit.
Copper and Copper Manganese in Cast Iron, by L. W. Eastwood, C. T. Eddy and A. E. Bousu, Michigan School of Mines and Technology, Houghton, Mich.
Symposium on Alloy Cast Iron: Report of Committee on Foundry Practice; Report of Committee on Specific Applications; Report of Committee on Heat Treatment.

2:00 p.m.—*Progress of Medical, Legislative and Engineering Aspects of Safety and Hygiene in the Foundry*

Chairman—Dan M. Avey, president, American Foundrymen's Association.
Medical Aspects, by Dr. R. R. Jones, past assistant surgeon, division of labor standards, U. S. department of labor, Washington.
Legislative Aspects, by Voyta Wrabetz, chairman, Industrial Commission of Wisconsin.
Open Forums—Discussion leader, Dr. J. A. Britten, chief surgeon, International Harvester Co., Chicago.

Saturday, May 9

9:00 a.m.—*Exhibits Open—Detroit Day*

4:00 p.m.—*Exhibits Close*

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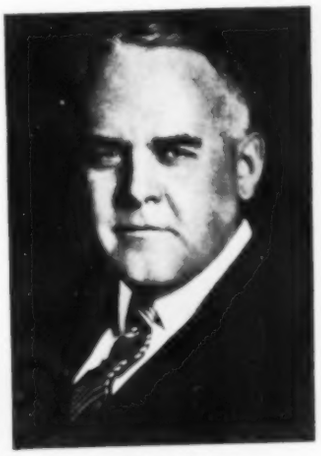

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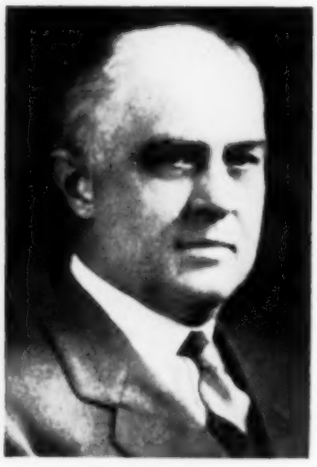
James H. Lansing

Leslie G. Korte



W. P. Putnam

J. F. Miller

P. W. Mulder

C. H. Miller

Mrs. Neil McArthur

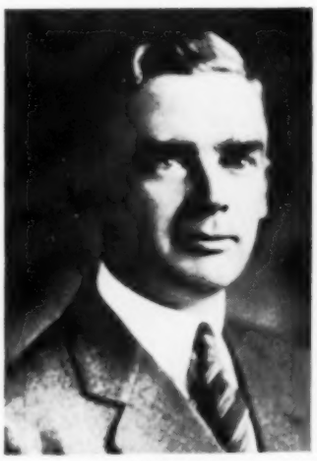
Frank H. Dodge

R. G. McElwee

Harry Rayner

M. T. Mortensen

Mrs. Hugh Martin



Neil McArthur

A. E. Rhoads

George A. Fuller

Mrs. W. H. J. Cluff

Ira F. Cheney

Jesse D. Stoddard

C. W. Jinnette

Dan Meloche

E. C. Hoenicke

Russell Scott

Harry B. Swan

L. D. Brady

Henry M. Lane

Mrs. E. F. Hill

R. B. Carolin

J. D. Cronenweth

Mrs. Hutton Haley

H. M. St. John

A. L. Boegehold

Kurt C. Babo

Fred J. Coulton

J. W. Collins

V. A. Crosby

Mrs. George Grimes

W. R. Thompson

C. J. Freund

Arnold Lenz

Herbert M. Rich

Mrs. Fred Erb

F. G. Sefing

Harry W. Dietert

Hutton H. Haley

Mrs. J. A. Moore

Mrs. P. W. Mulder

(*Continued from page* 29)

constitutes the basic process in motor car manufacture. Convention visitors will find Detroit a beautiful city, thriving in industry and generous in hospitality.

On Monday, May 4, the plant visitation committee under the chairmanship of Fred Erb, Eaton-Erb Foundry Co., will conduct the only organized plant visits during the convention week. Two simultaneous trips will be arranged, the first to the Great Lakes Steel Co. and the second to the Ford Motor Co. Buses will leave the Statler and Book-Cadillac hotels at 10 a. m. Lunch will be served during both of the trips.

Many Plants Open

The committee also has arranged for the following plants to be available for inspection by convention visitors at various times during the week: Aluminum Co. of America; Atlas Foundry Co.; Bohn Aluminum & Brass Corp.; Buick Motor Co., Flint; Central Iron Foundry Co.; Chevrolet Gray Iron Foundry division of General Motors Corp., Saginaw; Chrysler Corp.; Climax Molybdenum Research Laboratories; Detroit Gray Iron Foundry Co.; Detroit Testing Laboratory; Cadillac Motor Car Co.; City Pattern Works; Detroit Steel Casting Co.; Eaton-Erb Foundry Co., Vassar; Ford Motor Co.; Great Lakes Steel Corp.; Michigan Malleable Iron Co.; Michigan Steel Castings Co.; Packard Motor Car Co.; Saginaw Malleable Iron division of General Motors Corp., Saginaw; Stuart Foundry Co.; and the U. S. Radiator Corp. The committee will have complete information on plants which may be visited available at the registration booth in convention hall.

The stag dinner and smoker, to be held at the Hotel Statler on Tuesday evening, May 5, under the joint auspices of the Foundry Equipment Manufacturers' association, the American Foundrymen's association and the Detroit Chapter of the A.F.A. promises to be one of the largest affairs of its kind in the history of the association. A special entertainment program including acts featured by the local theaters and night clubs now is being arranged by a Detroit committee, with William J. Muhlitner, Great Lakes Foundry Sand Co., as chairman. Tickets will cost $2.00 and may be secured through the F.E.M.A., A.F.A., members of the Detroit committee or at the registration desk at Convention hall.

Tentative Schedule of Convention Activities

Monday, May 4

Registration, Convention Hall
Plant Visitation

Tuesday, May 5

Exhibits open at Convention Hall, 9 a.m., close at 6 p.m.
Cast Iron Shop Course, 9 a.m.
Opening Meeting, 10 a.m.
Nonferrous Practice, 11 a.m.
Malleable Cast Iron, 11 a.m.
Gray Iron Founders' Society, Annual Meeting, Hotel Statler, 11 a.m.
Luncheon and Round Table Discussion for Engineering Instructors, 12:30 p.m.
Sand Research, 2 p.m.
Sand Control Shop Course, 4 p.m.
Dinner, Smoker, and Entertainment—A.F.A., F.E.M.A. and Detroit Chapter of A.F.A., 7 p.m.

Wednesday, May 6

Exhibits open at Convention Hall, 9 a.m., close at 6 p.m.
Cast Iron Shop Course, 9 a.m.
Cast Iron, 10 a.m.
Malleable Cast Iron, 10 a.m.
Luncheon and Round Table Discussion for Nonferrous Division, 12:30 p.m.
Apprentice Training, 2 p.m.
A.F.A. Cost Committee, 3:30 p.m.
Sand Control Shop Course, 4 p.m.
Foundry Refractories, 8 p.m.
Steel Founding, 8 p.m.
Conference of A.F.A. Chapter Officers, 8 p.m.

Thursday, May 7

Exhibits open at Convention Hall, 9 a.m., closes at 6 p.m.
Cast Iron Shop Course, 9 a.m.
Cast Iron, 10 a.m.
Nonferrous Castings, 10 a.m.
Luncheon and Round Table Discussion for Steel Division, 12:30 p.m.
Luncheon and Round Table Discussion for Malleable Division, 12:30 p.m.
Annual Business Meeting, 3:30 p.m.
Sand Control Shop Course, 4 p.m.
Annual Dinner of A.F.A., 7 p.m.
Reception and Dance

Friday, May 8

Exhibits open at Convention Hall, 9 a.m., close at 6 p.m.
Cast Iron Shop Course, 9 a.m.
Steel Founding, 10 a.m.
Cast Iron, 10 a.m.
Symposium on Safety and Hygiene in the Foundry Industry, 2 p.m.

Saturday, May 9

Exhibits open at Convention Hall, 9 a.m., close at 4 p.m.

Arrange Ladies Program

The ladies' entertainment committee of the Detroit chapter, with James L. Mahon, American Car & Foundry Co., general chairman and Mrs. Vaughan Reid, chairman, has arranged an exceedingly attractive program for the ladies attending the convention. Ladies' registration headquarters will be maintained at the Book-Cadillac hotel from Monday throughout the week. On Tuesday afternoon, May 5, from 3 to 5, a tea will be held in the Book-Cadillac hotel. Wednesday morning at ten the ladies will be taken in cars to the Greenfield Village at Dearborn, the historic village restored by Henry Ford, and at 12:30 the party will have luncheon at the Dearborn Inn. Shopping tours and a trip to the Shrine of the Little Flower at Royal Oak, Mich. are planned for Thursday, and Friday will be held open for shopping. Information on the ladies program, points of interest in Detroit, and shopping centers will be available at the ladies' registration headquarters.

The annual banquet, to be held Thursday evening at the Book-Cadillac hotel, will feature the presentation of A.F.A. gold medals to Dr. Heinrich Ries and David McLain, and an address by W. J. Cameron of the Ford Motor Co. Mr. Cameron is well known throughout the country for his interesting and timely talks on

(*Please turn to page* 80)

MECHANICAL MARVELS TO FEATURE SHOW

Air view of a section of Detroit showing the business section in the upper right, Convention hall, and the Fisher and General Motors buildings in the center foreground. Illustration courtesy the Detroit News

TO AN industry moving rapidly toward full capacity operations, the Foundry and Allied Industries Exposition, to be held in the Convention hall in Detroit, May 4 to 9, in conjunction with the fortieth annual convention of the American Foundrymen's association, will provide answers to many production problems. To foundrymen facing a shortage of skilled men, a greater demand for castings, a need for better housekeeping, a desire to reduce production costs, and many other perplexities, the coming foundry show will be a revelation.

The 1936 Foundry and Allied Industries Exposition promises to be one of the best in many years. The large convention hall in Detroit, located between Woodward and Cass avenues and fronting on both streets, about two miles north of the downtown section, provides excellent facilities for the foundry show. All exhibits are located on the street level, and the exhibition building is divided into four large halls, permitting separate grouping of operating and nonoperating exhibits. The Cass avenue bus, which may be boarded on Woodward or at Grand Circus park, stops at the main entrance of the Convention hall. In addition to the exposition, practically all of the technical sessions, shop courses and round table discussions will be held in rooms provided at the Convention hall.

Many new developments in foundry equipment will be shown in operation for the first time at Detroit. Since the Philadelphia show in 1934, manufacturers of equipment and supplies have gone far in perfecting old lines, in pioneering in new fields which will serve the foundry industry. As may be noted on the opposite page, an exceptionally large number of companies will be represented at the exposition. Of special importance to convention visitors is the stress which the equipment industry is placing on the display of equipment in operation. Advance plans for many of the displays indicate that the foundry show of 1936 probably will hold greater interest for the industry than any held in the past.

The mechanical marvels of the industry, which will make possible the foundry of tomorrow, will be featured at Detroit.

MANY TO EXHIBIT AT DETROIT

(List Released April 7)

A

Abrasive Co.
Abrasive Industry
Aerovent Fan Co.
Ajax Electric Furnace Co.
Ajax Electrothermic Corp.
Ajax Flexible Coupling Co.
Ajax Metal Co.
Albany Sand & Supply Co.
Alpha-Lux Co. Inc.
American Air Filter Co. Inc.
American Brake Shoe & Foundry Co.
American Bridge Co.
American Crucible Co.
American Foundry Equipment Co.
American Gum Products Co.
American Sheet & Tin Plate Co
American Steel & Wire Co.
Arcade Mfg. Co.
Armstrong Blum Mfg. Co.
Automatic Transportation Co.
Ayers Mineral Co.

B

C. O. Bartlett & Snow Co.
Beardsley & Piper Co.
Bethlehem Steel Co.
Black & Decker Mfg. Co.
Blaw-Knox Co.
Boyer-Campbell Co.
Bradley Washfountain Co.

C

Campbell-Hausfeld Co.
Carborundum Co., Abrasive Division
Carborundum Co., Refractory Div'n.
Edwin S. Carman Inc.
Carnegie-Illinois Steel Corp.
Certified Core Oil & Mfg. Co.
Chain Belt Co.
Champion Foundry & Machine Co.
Chateaugay Ore & Iron Co.
Chicago Mfg. & Distributing Co.
Clark Tructractor Co.
Clearfield Machine Co.
Cleveland Flux Co.
Cleveland Quarries Co.
Climax Molybdenum Co.
L. A. Cohn & Bros. Inc.
Columbia Steel Co.
Combined Supply & Equipment Co.
Corn Products Sales Co.
Cyclone Fence Co.

D

Daily Metal Trade
Wm. Demmler & Bros.
Detroit Electric Furnace Co.
Detroit Hoist & Machine Co.
Detroit Testing Machine Co.
Harry W. Dietert Co.
Dings Magnetic Separator Co.
Joseph Dixon Crucible Co.
Domhoff & Joyce Co.

E

Eastern Clay Products Inc.
Eaton-Erb Foundry Co.
Economy Tool & Machine Co.
Electro-Chemical Pattern & Mfg. Co.
Electro Metallurgical Co.
Electro Refractories & Alloys Corp.

F

Fanner Mfg. Co.
Federal Foundry Supply Co.
Federated Metals Corp.
Ford Motor Co.
The Foundry
Foundry Equipment Co.
Foundry Supplies Mfg. Co.
Foxboro Co.

G

Globe Steel Abrasive Co.
Great Lakes Foundry Sand Co.
Grindle Fuel Equipment Co.
Grob Brothers

H

Hanna Furnace Corp.
Hauck Mfg. Co.
Herman Pneumatic Machine Co.
Hickman, Williams & Co. Inc.
Hill & Griffith Co.
Hines Mfg. Co.
Hougland & Hardy Co.
Howell Industrial Truck Co.
Hutton H. Haley & Associates

I

Illinois Clay Products Co.
Illinois Testing Laboratories Inc.
Industrial Equipment Co.
Industrial Minerals Co.
Industrial Silica Corp.
Ingersoll-Rand Co.
International Correspondence Schools
International Molding Machine Co.
International Nickel Co. Inc.
Ironton Fire Brick Co.

J

Jeffrey Mfg. Co.
Johnston & Jennings Co.

K

Kindt-Collins Co.
H. Kramer & Co.

L

Lancaster Iron Works Inc.
Lava Crucible Co. of Pittsburgh
R. Lavin & Son
E. Leitz Inc.
Linde Air Products Co.
Link-Belt Co.

M

J. S. McCormick Co.
McIlvaine Foundry Conveyor Co.
Machine Design
Macklin Co.
Magnetic Mfg. Co.
Material Service Corp.
Mathews Conveyer Co.
Michigan Smelting & Refining Co.
Michigan State College
Milwaukee Foundry Equipment Co.
Modern Equipment Co.
Motch and Merryweather Machinery Co.
Mt. Jewett Fire Clay Co.
Mullite Refractories Co.

N

National Engineering Co.
National Foundry Sand Co.
Newaygo Engineering Co.
New Haven Vibrator Co. Inc.
New Jersey Silica Sand Co.
Niagara Falls Smelting & Refining Corp.
Wm. H. Nicholls Co. Inc.
Norton Co.

O

S. Obermayer Co.
Oiless Core Binder Co.
Oliver Machinery Co.
Osborn Mfg. Co.

P

Pangborn Corp.
Parsons Engineering Corp.
Peerless Mineral Products Co
Penn-Rillton Co.
Penton Publishing Co.
George F. Pettinos Inc.
C. E. Phillips & Co.
Pickands Mather & Co.
Pittsburgh Crushed Steel Co.
Pittsburgh Lectromelt Furnace Corp.
Pyro Clay Products Co.
Pyrometer Instrument Co.

Q

Quandt Chemical Co.
Quigley Co.

R

Ramtite Co.
N. Ransohoff Inc.
Ready-Power Co.
Reeder Mfg. Co.
Republic Coal & Coke Co.
Republic Steel Corp.
Robbins & Myers Inc.
Robeson Process Co.
Robinson Machine Co.
Royer Foundry & Machine Co.
Ruemelin Mfg. Co.

S

Safety Equipment Service Co.
Safety First Shoe Co.
Sand Products Corp.
Claude B. Schneible Co.
Schramm Inc.
Scully Jones Co.
Scully Steel Products Co.
Shepard Niles Crane & Hoist Corp.
Simplicity Engineering Co.
W. W. Sly Mfg. Co.
Smith Facing & Supply Co.
Smith Oil & Refining Co.
Werner G. Smith Co.
Spencer Turbine Co.
S. P. O. Inc.
Standard Conveyor Co.
Standard Safety Equipment Co.
Standard Sand & Machine Co.
Steel
Steel Shot & Grit Co.
Steelblast Abrasives Co.
Steel City Testing Laboratory
Sterling Grinding Wheel Co.
Sterling Wheelbarrow Co.
Frederic B. Stevens Inc.
N. A. Strand & Co.
Superior Charcoal Iron Co.
Swan Finch Oil Corp.

T

Tabor Mfg. Co.
Taggart & Co.
Tamms Silica Co.
Tefft Jackson, Inc.
Tennessee Coal, Iron & R. R. Co.
Warner R. Thompson Co.
Titanium Alloy Mfg. Co.
Treat-Nantke Co. Inc.
Truscon Steel Co.
W. S. Tyler Co.

U

Union Carbide Co.
United Compound Co.
United States Electrical Tool Co.
United States Graphite Co.
United States Hoffman Machinery Corp.
United States Steel Corp.
University of Michigan

V

Vanadium Corp. of America
Van Dorn Electric Tool Co.
Vesuvius Crucible Co.

W

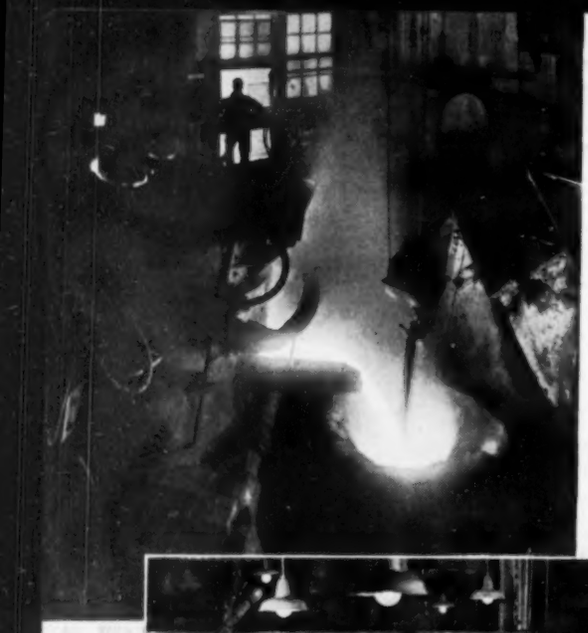
A. T. Wagner Co.
Whitehead Brothers Co.
Whiting Corp.
E. J. Woodison Co.

Y

Yale & Towne Mfg. Co.
Young Bros.

Z

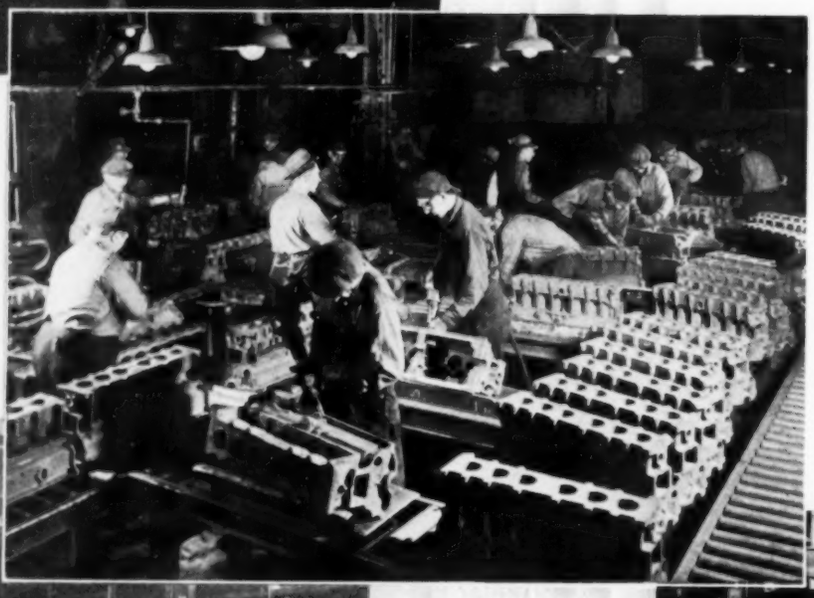
Zanesville Sand Co.

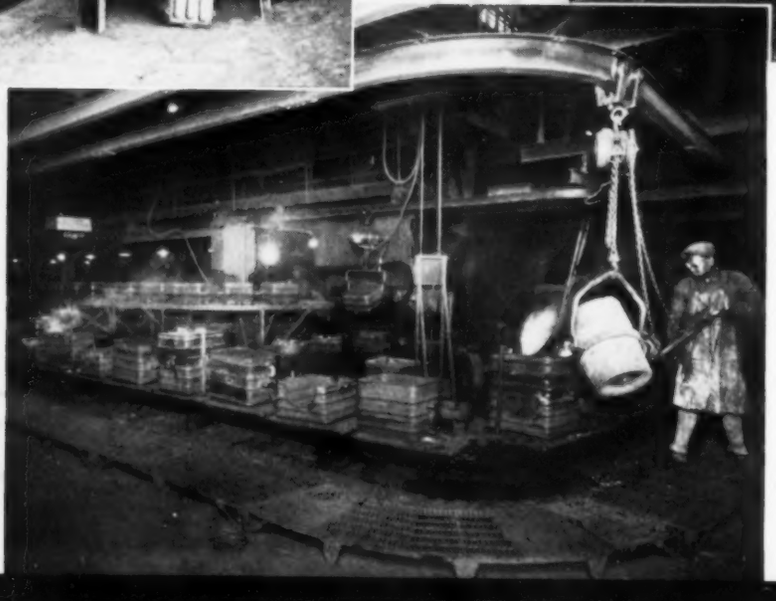


DETROIT LEADS OF CASTINGS

FOUNDRIES in Detroit and the surrounding territory probably pour a greater tonnage of castings annually than is produced in any other city in the world. With automobile manufacturers constantly finding a greater use for cast parts in the design of modern passenger cars and trucks, foundries operated by motor car manufacturers and parts makers are obliged to increase castings output continually. Recently, several new and modern foundries have been placed in operation for the production of automobile castings.

Necessity has made the foundrymen of Detroit pioneers in the development of the modern production foundry. Much of the equipment now employed in the foundries of all civilized countries first



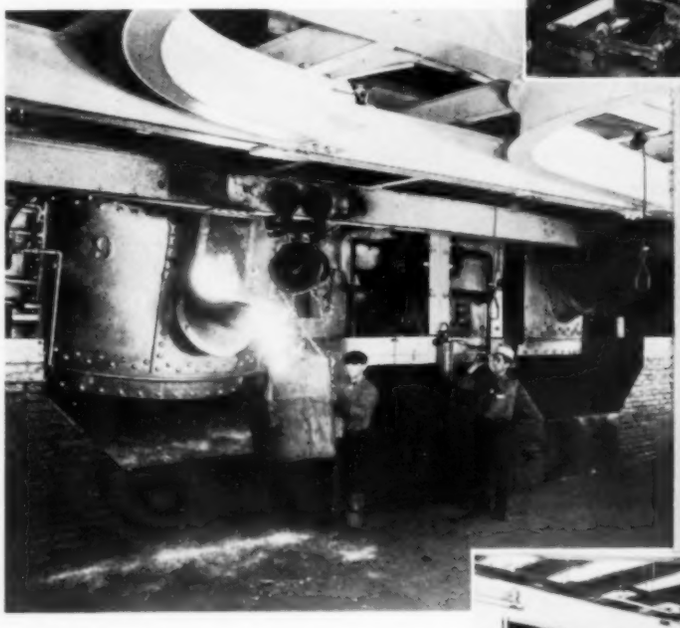


Views of Detroit Foundries. Top to bottom—Tapping an electric furnace at Michigan Steel Castings Co. Chipping room, Chevrolet foundry at Saginaw. Molding floor at Federal-Mogul Corp. Pouring on conveyor at Packard Motor Car Co. foundry. Above—Pouring metal at Ford foundry

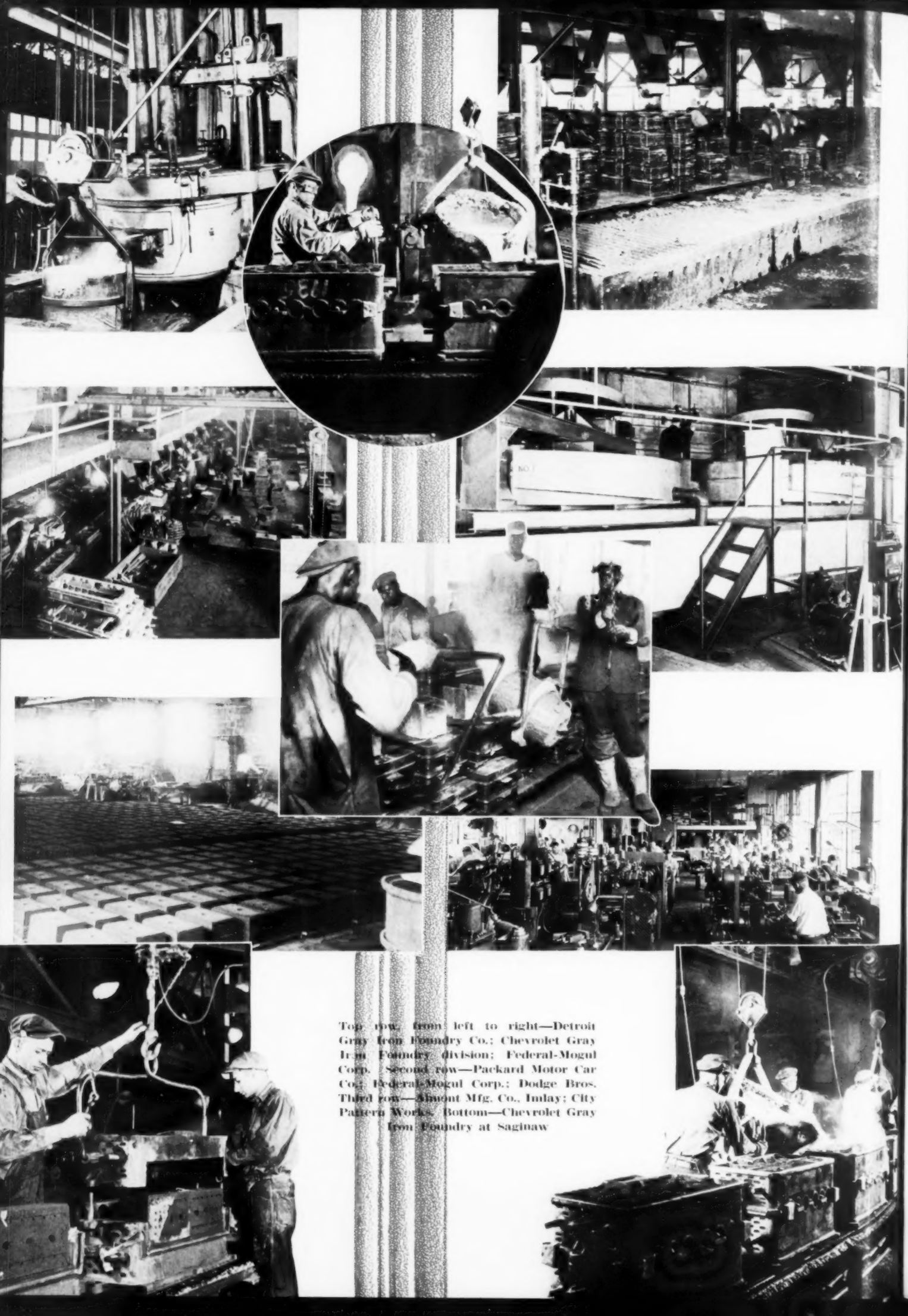
IN TONNAGE PRODUCED

was tried out and perfected in Detroit. The progressive spirit of the American automobile manufacturer, which has placed the motor car within the reach of the vast majority of citizens, has recorded remarkable achievements in improvements in casting practice. At the same time developments in methods, equipment and processes has permeated the other foundries of the city. In addition to gray iron, the city boasts of large foundries producing steel, malleable and nonferrous castings.

Hospitality of Detroit foundrymen is well exemplified in the preparations which have been made to permit visitors at the annual A.F.A. convention to view the production of a wide variety of castings. The two simultaneously organized (*Please turn to page* 122)



Many interesting developments will be found in the foundries of Detroit. Above—Tapping large metal reservoir at Ford Motor Co. Right from top to bottom—Bench core work at the Saginaw Chevrolet foundry. Grinding and inspecting at Federal-Mogul Corp. Bottom two, operations at City Pattern Works



Top row, from left to right—Detroit Gray Iron Foundry Co.; Chevrolet Gray Iron Foundry division; Federal-Mogul Corp. Second row—Packard Motor Car Co.; Federal-Mogul Corp.; Dodge Bros. Third row—Belmont Mfg. Co., Imlay; City Pattern Works. Bottom—Chevrolet Gray Iron Foundry at Saginaw

A. F. A. Awards Two Gold Medals

Dr. Heinrich Ries

David McLain

DOCTOR HEINRICH RIES, professor of geology and head of the department, Cornell University, Ithaca, N. Y., and David McLain, president and founder, McLain's System, Inc., Milwaukee, recently were voted gold medals of the American Foundrymen's association by the board of directors acting on the recommendation of the board of awards. Dr. Ries was awarded the Joseph S. Seaman medal in recognition of his outstanding services to the foundry industry and the A.F.A. in the field of foundry sand research and control, and Mr. McLain was awarded the J. H. Whiting medal in recognition of his many contributions to the progress of the foundry industry in the training of men and the stimulating of wide interest in better melting practices. Formal presentation of the medals will be made at the annual dinner of the association held on Thursday evening, May 7, during the annual convention in Detroit.

Dr. Ries, one of the first to direct scientific attention to the proper control of foundry sands, was born in Brooklyn, N. Y., in 1871. He acquired his technical training at the Columbia School of Mines, New York, receiving the degrees of M. A. and Ph. D. He is recognized internationally as an authority on economic geology, being the author of several books, including *Economic Geology, Clay-Occurrence, Properties and Uses*, and with T. L. Watson, *Engineering Geology*.

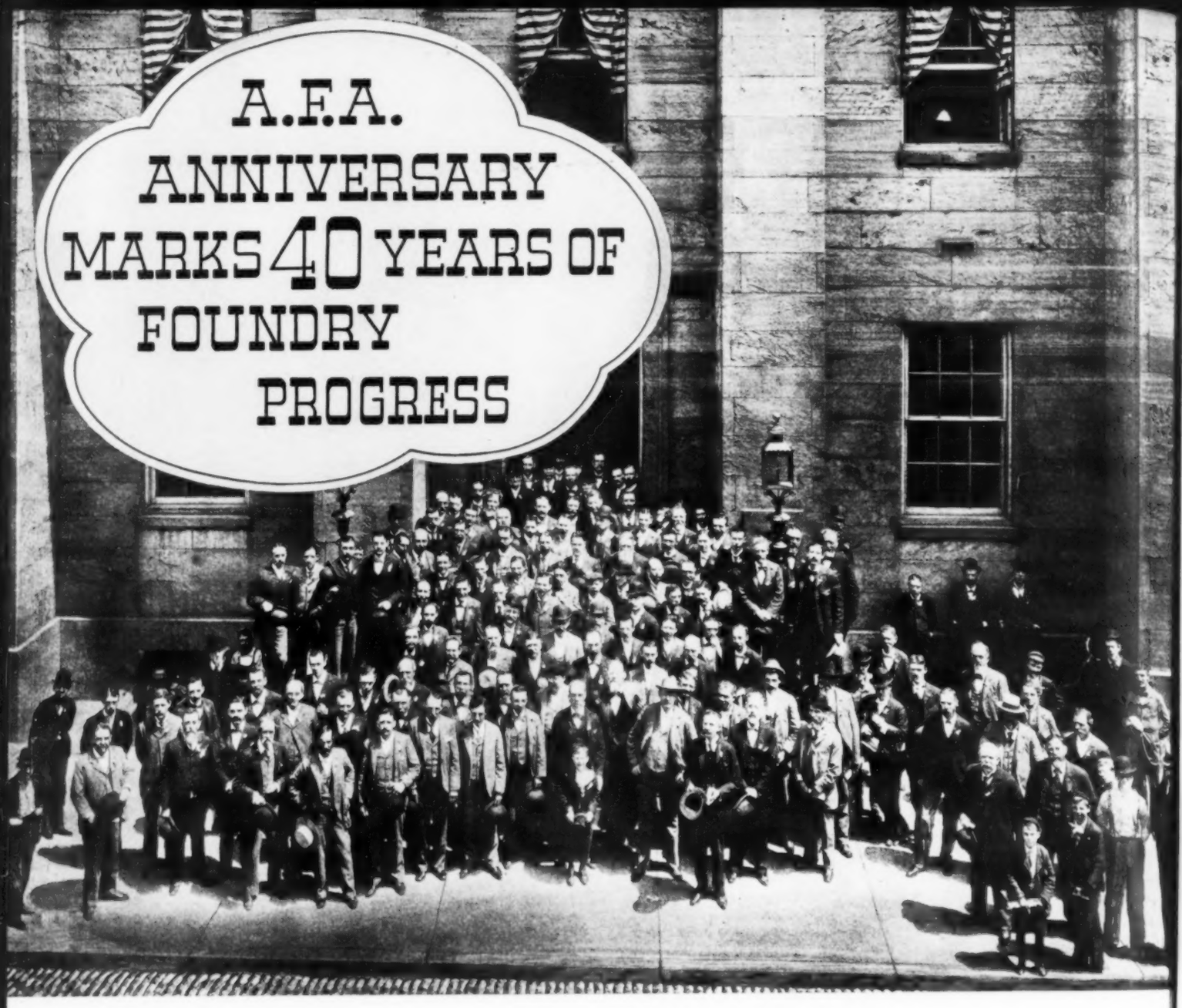
His interest in the subject of foundry sands extends over a period of many years. In 1905, as a result of his geological survey of foundry sands in Wisconsin, he presented an interesting paper on that subject before the A.F.A. When the joint committee of foundry sands was organized in 1920 by the Engineering Research council, he was enlisted to aid in that cooperative work. Since that time he has been a leader in the field and at present is technical director of the A.F.A. committee on foundry sand research.

Dr. Ries is an honorary member and a past director of the A.F.A., a member of the Institute of Mining and Metallurgical Engineers, Canadian Mining institute, English Ceramic society and a member and past president of the American Ceramic society and the Geologic Society of America.

David McLain, one of the most widely known men of the foundry industry, was born in Belfast, Ireland, Nov. 11, 1863, and when 5 years old came to the United States with his parents, settling in Pittsburgh. His first experience in the foundry industry, twisting hay ropes for core barrels in a pipe foundry, was obtained during the depression of 1873, when, before reaching the age of 10, it became necessary for him to help support the family. When 15, he was a molder in the first successful steel foundry in the country. After working in a number of steel foundries, he was made a foreman at the age of 23 and placed in charge of the first bessemer converter steel foundry in America. From 1897 to 1900 he operated a crucible steel foundry in Milwaukee, the city which he has since made his home.

While superintendent of a company operating steel, gray iron and brass foundries, Mr. McLain completed his experiments on using large percentages of steel scrap in cupola iron mixtures, thus pioneering in a field of melting practice which was contrary to the practices of that day. Later, while engaged in consulting work in foundries throughout (*Please turn to page* 103)

A.F.A. ANNIVERSARY MARKS 40 YEARS OF FOUNDRY PROGRESS

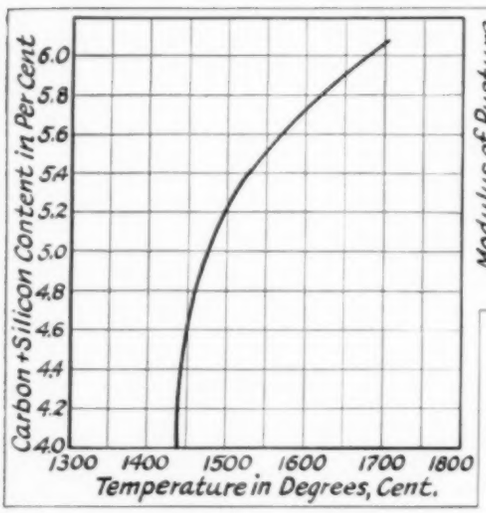


COMMEMORATING the fortieth anniversary of the founding of the American Foundrymen's association, THE FOUNDRY presents a previously unpublished photograph of a group taken in Philadelphia, May 12, 1896. The evening session of the first day's activities was held at the old Franklin institute building, which since has been replaced by the splendid new facilities inspected during the 1934 International Foundry Congress when a reception was tendered to the overseas guests.

The evening session, in 1896, which attracted this assemblage of old time foundry leaders was devoted to foundry equipment with a paper on cranes by A. E. Outerbridge, Jr., Wm. Sellers & Co., Inc., Philadelphia, and one on compressed air by Curtis W. Shields, Ingersoll-Sergeant Drill Co., New York. Prominent in the foreground center are Francis Shuman, president, John A. Penton, secretary and Howard Evans, treasurer of the American Foundrymen's association which had been established by resolution at an earlier meeting that day, May 12, 1896.

This historic occasion resulted from a movement inaugurated by the Philadelphia Foundrymen's association, of which Howard Evans was secretary for almost thirty years. He was assisted in promoting the convention by Mr. Penton, editor of THE FOUNDRY, then published in Detroit. While only a few of the founders of the A. F. A. survive, many will recognize in this illustration the faces of leaders of the industry at the close of the century.

The photograph from which this reproduction was made, has been presented to the American Foundrymen's association by S. C. Vessy, W. W. Sly Co., Cleveland. It was the property of the late Wm. A. Harris, Bausch & Harris Machine Tool Co., Springfield, Mass., who was registered at the organization meeting of the A.F.A. Mr. Harris' son, D. L. Harris, formerly connected with the Sly company cherished and preserved this interesting relic.



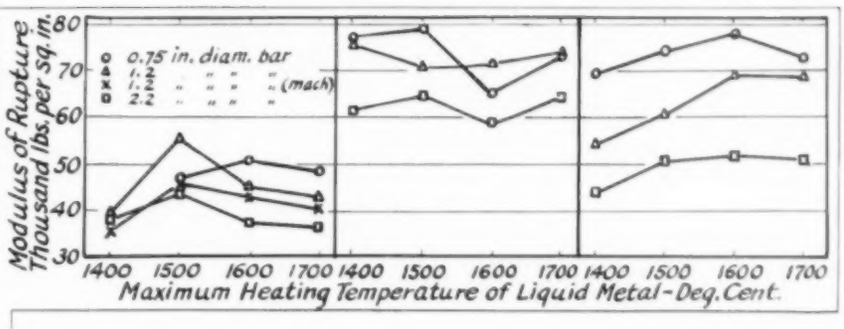

Modulus of Rupture Thousand lbs. per sq. in.
80
70
60
50
40
30
0.75 in. diam. bar
1.2 " " " " (mach)
2.2 " " " "
1400 1500 1600 1700 1400 1500 1600 1700 1400 1500 1600 1700
Maximum Heating Temperature of Liquid Metal - Deg. Cent.

Fig. 92 — Left — Heating curve to obtain eutectic structure of graphite. Fig. 93— Modulus of rupture as affected by maximum heating temperature

GRAY CAST IRON

By JOHN W. BOLTON

Chapter VII—Superheating

IN HIS original researches on electric furnace melting and duplexing of cast irons, Elliott noted the marked refining action and increases in combined carbon brought about by high melting temperatures.

It is well established that both melting temperature and time at temperature have marked effects on the properties of gray iron. Much valuable work has been done, but as yet the actual nature of reactions in molten metal which influences the final product, the casting, is but imperfectly understood. It might be well to mention that a long time at a moderately elevated temperature, as in the air furnace, acts similarly to a shorter time at a higher temperature.

Results in Increased Strength

If with an iron of fairly high carbon content to be made up in two batches, one is heated to 2600 degrees Fahr. and the other to 2950 degrees Fahr., it will be found that the metal heated to 2950 degrees Fahr. is finer grained and somewhat higher in combined carbon. The superheating results in some retardation of the cementite decomposition and in the precipitation of more finely divided graphite flakes, with consequent increase in strength. (Piwowarsky's German patent covers the range 2725 to 3100 degrees Fahr. Obviously this practice had been anticipated in practice of various American works.)

As shown in Table IX, Piwowarsky found that in an iron, carbon 3.00 per cent, silicon 2.20 per cent, manganese 0.45 per cent, phosphorus 0.02 per cent and sulphur, trace, heating to elevated temperatures resulted in some lowering in temperature of eutectic solidification, in spite of the retarded rate of cooling due to the increased pouring temperature.

In Fig. 92, Piwowarsky indicates the temperatures to which metal must be heated to obtain finest graphite structure. It will be noted that the maximum temperature increases with increase in the sum of percentage carbon plus percentage silicon.

Hannemann, Piwowarksky and other German investigators at first advanced what is known as the graphite nuclei theory. According to this theory unless high temperatures are reached there remains in the melt a number of mechanically disseminated graphite particles, undissolved, which act as nuclei for rapid and coarse graphite formation on cooling. When these are removed by superheating there are no centers for crystallization and on cooling some surfusion occurs before rapid and spontaneous general crystallization occurs. It also is held that the dissolved carbon in the melt may occur as partly dissociated carbide (i.e. as atomic and carbide carbon) and the degree of dissociation decreases with increase in temperature up to a certain optimum temperature.

Inversion May Take Place

However, it has been found in some cases that even higher superheating may cause an inversion of the aforementioned actions, there being then a tendency for more complete graphitization, formation of pseudo eutectic graphite and ferrite being noted in some cases, precipitation of coarser graphite in others.

Insofar as ordinary superheating is concerned, improvement in properties is more apparent in nearly eutectiferous irons. As shown by Bardenheuer and Zeyn decidedly low carbon, low silicon (hypo eutectic irons) are in fact impaired by superheating. Moduli of rupture of three irons, as affected by maximum heating temperature, is shown in Fig. 93, Saeger and Ash—*Transactions* A.F.A., 1933.

The simple graphite (*Please turn to page* 93)

DETROIT FOUNDRY MELTS METAL IN ROTARY FURNACES

By PAT DWYER

Fig. 1—Small pouring ladles are filled from a reservoir ladle mounted on a truck leading under the nose of the furnace

A MILLION dollar foundry recently erected and placed in operation by the Kelsey-Hayes Wheel Co., Detroit, as part of a general extension program, may be taken as a fair indication that the foundry industry definitely is emerging from the gloom and inactivity of the past 5 years. Refinements in mechanical equipment, methods of operation, and quality of product, features developed by foundrymen and manufacturers of equipment in recent years under the sharp spur of competition, have been incorporated in the new plant bounded on three sides by Military, McGraw and Ironsides avenues and on the fourth side by the Pere Marquette railroad.

The foundry building of brick, steel and glass construction, 230 x 467 feet, covers nearly one half of a 10-acre property. Steel columns supporting the roof divide the foundry into four main bays, supplemented by a roofed yard 90 x 550 feet on the railroad side. The building is floored with wood blocks while the roof and walls extending from the eaves to the top of the continuous window sash are formed of specially treated corrugated steel core sheet coated with layers of asphalt and asbestos. Daylight entering through the side windows is supplemented by extensive skylights set directly in the sloping roof over each bay. Large ventilators projecting through the peaks of the various roofs and connected to an extensive piping system on the inside of the building maintain the air in the building in a satisfactory condition.

Some of the 28 ventilators operate on natural draft, while power attachments promote the

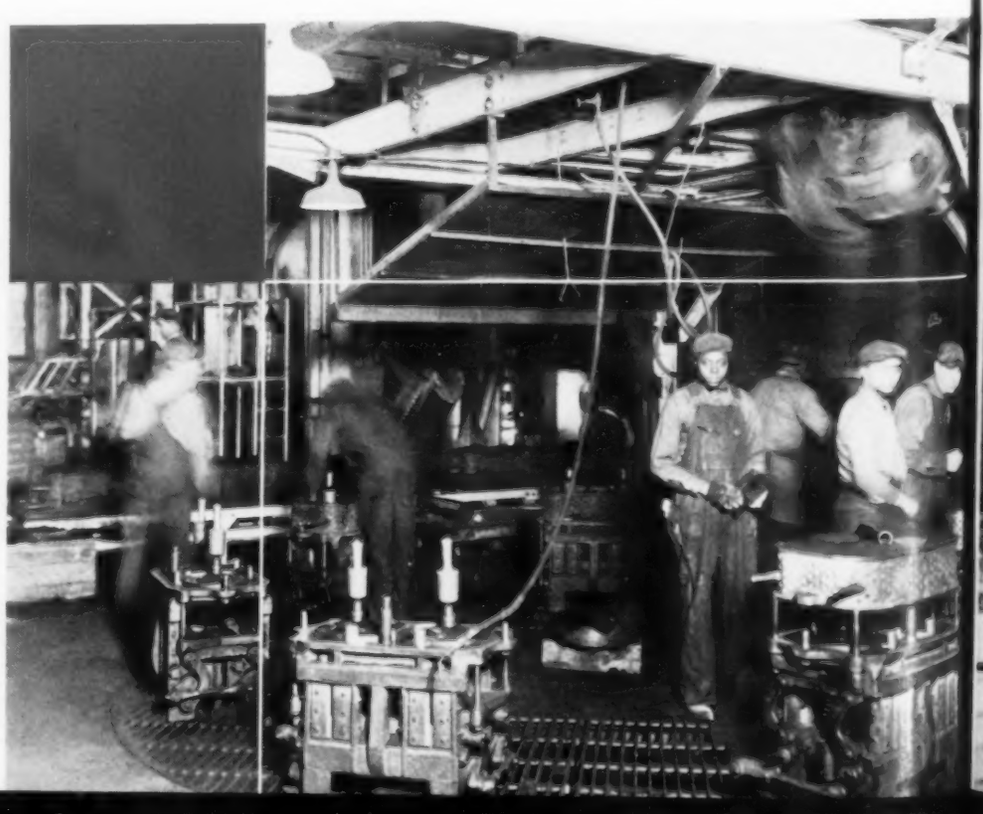


Fig. 2—The beginning of the cycle appears at the left of the illustration and the conclusion at the right

activity of the others, for example over the furnaces, over the molding units and core ovens. The ventilation system provides four or five changes of air per hour over certain sections of the foundry, ten changes per hour over the pouring sections, 12 to 13 changes per hour in the cleaning department, 25 changes in the heat treating division and 115 changes per hour in the vicinity of the electric furnace.

Floating dust is removed from the air through nine wet dust collector units supplied by the Claude B. Schneible Co., Chicago. The units are located at the shakeout stations, at the sand conditioning plants, at the pressure blasting stations, at the grinding wheels and at the core sand mixing machines. The sludge from all the units is pumped to a central dewatering station where the sludge is disposed of and the water recirculated through the system from a surge tank.

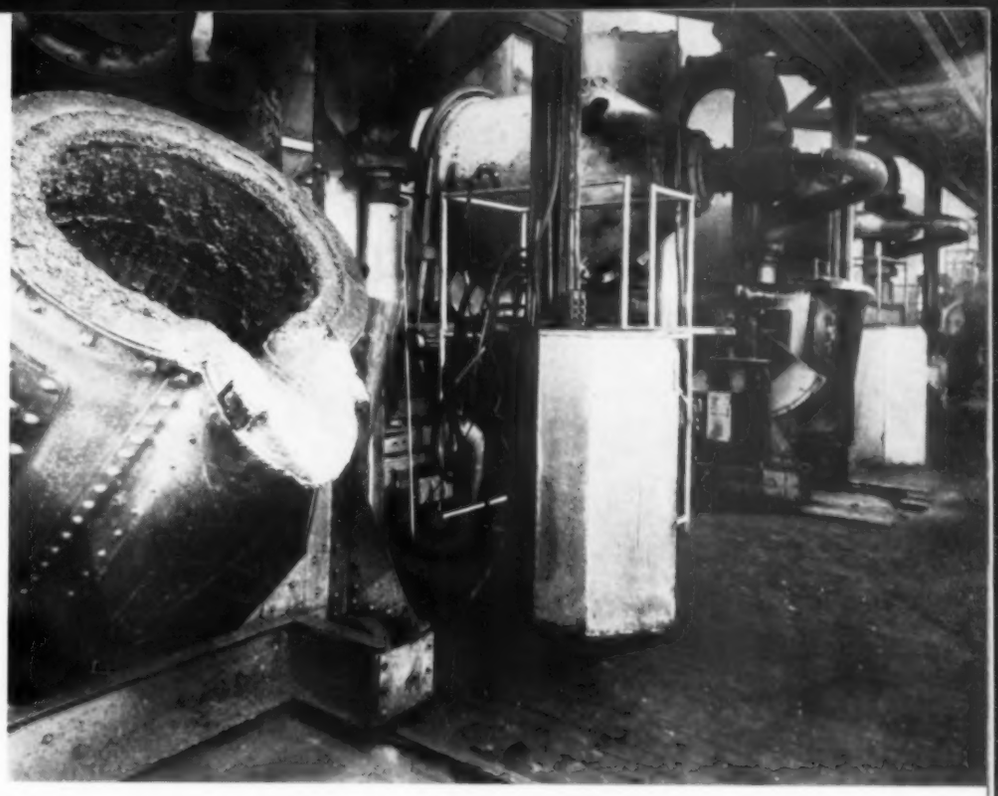


Fig. 4—General view of the melting department of the foundry containing four powdered coal furnaces and one electric furnace

Castings made in this foundry are for automobile wheel hubs and brake drums. In some instances wheel hub and brake drum are cast as a unit, while in other instances the parts are cast separately and afterward assembled as complete units. All metal melted in the foundry falls under two classifications. A certain amount is high quality gray iron, while the remainder is a special metal partaking somewhat of the characteristics of malleable iron and steel. In the as cast state the metal is white and brittle. After a suitable heat treatment the metal becomes strong, ductile and fine grained. Further reference to this phase of the subject will be taken up later in a description of the melting equipment and method of operation.

Molds are made on two self contained molding units, one for the gray iron castings and the other for the copper-silicon-steel castings. Since the two units are alike in practically every particular, a description of one will serve for both. The steel casting unit is equipped with two sandslingers made by the Beardsley & Piper Co., Chicago, and with two jolt squeeze molding machines made by the Osborn Mfg. Co., Cleveland. In each instance one machine is devoted to the production of drags, while copes are made on the other. The molds are closed on one part of an extensive conveyor. Each sandslinger is provided with the new pendant movable spout instead of the former articulated horizontal arm. To offset the danger of contraction strains incident to hard ramming, the sand has a permeability of 105, bond 8 to 9 and a moisture content of 4 per cent.

Seven duplicate patterns mounted on machines made

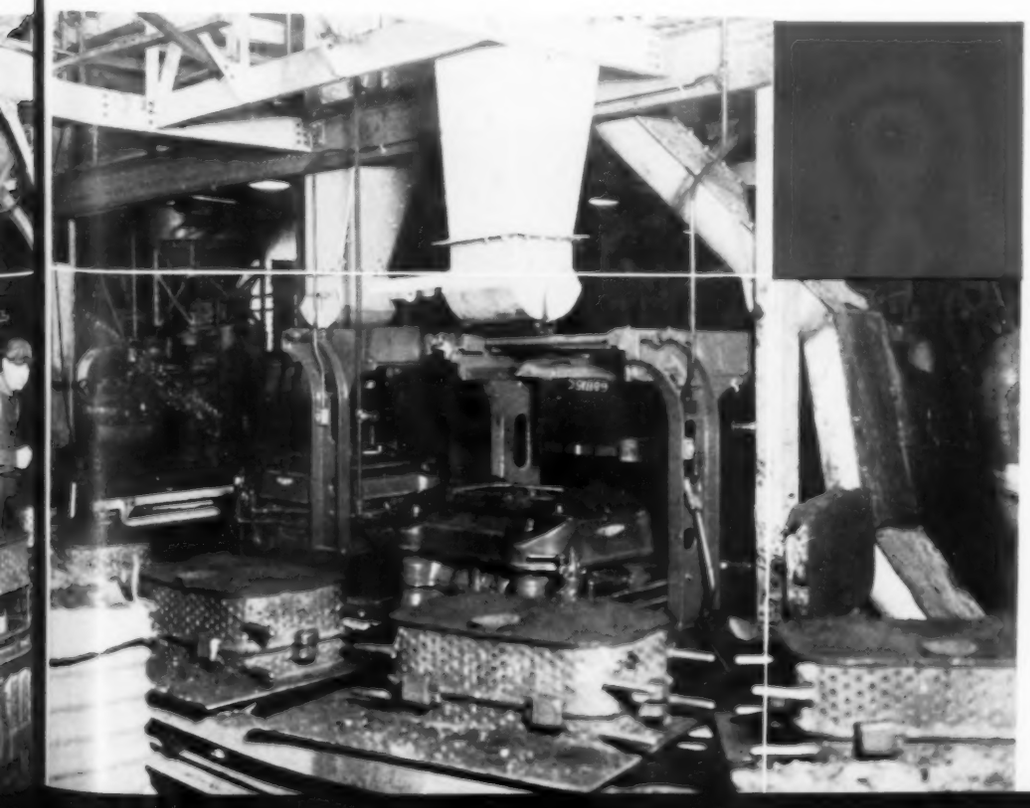
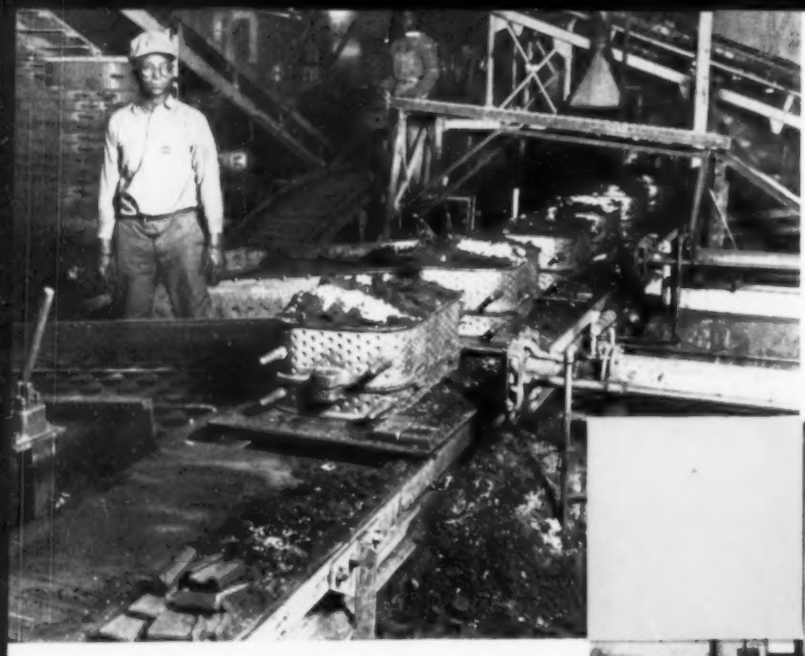


Fig. 3—The upper end of the sprue in each mold is reinforced by a dry sand tapered ring pouring cup



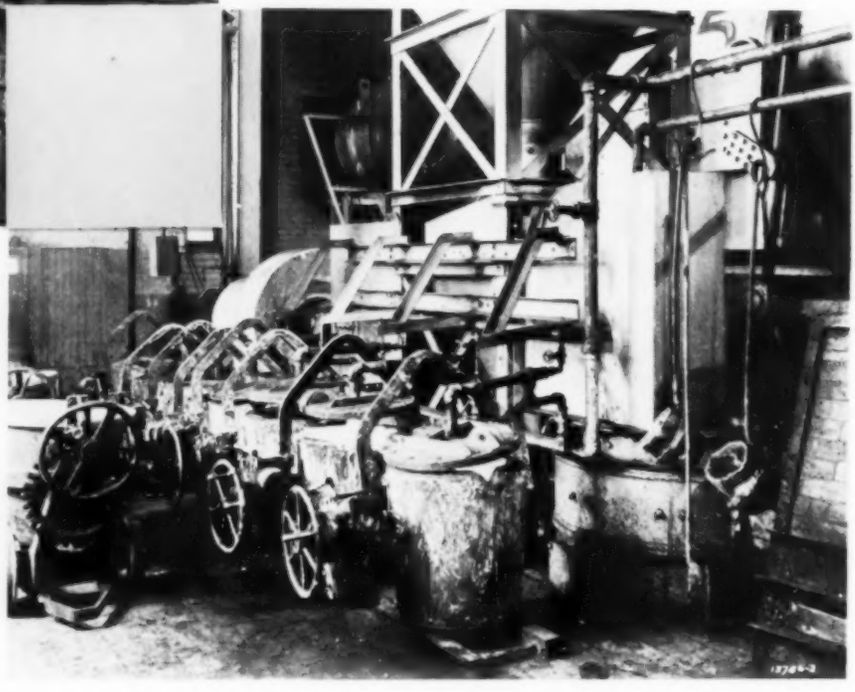


Fig. 5 (Above)—Two pneumatically operated rams push the molds onto the vibrating screens. Fig. 6 (Right)—Linings of small ladles are preheated before use. One of the small cast iron slag ladles is shown at the extreme right

by the Champion Machine Co., Chicago, and attached in turn to a grated turntable pass under the sandslinger. At the next stage a hand lever as shown in Fig. 2 actuates lifting pins which raise the mold away from the pattern. Two attendants remove the drag, turn it over and place it on the conveyor. A corresponding cope made in the same manner on the adjoining unit is lifted from the machine, and without turning over is placed directly on the drag. Before the cope is placed, the center core is tested for accuracy of position by the gage shown in Fig. 7. This illustration also shows the type of gate through which the metal enters the mold cavities on either side.

Metal from the ladle first enters a dry sand pouring cup set in the cope as shown in Fig. 3. Below the pouring cup the metal flows through a circular strainer core with one central and two side branches. The small gates which conduct the metal into the mold are formed in the cope face. A riser the full size of the center hub and flaring to a slightly larger size at the top extends from the hub to the top of the cope. The pattern parts for forming gates, runner and risers are shown in detail in Fig. 2.

The conveyor carries the molds around a turn in the loop to a long, straight section where the metal is poured into them. The men handling the ladles stand on a steel platform which moves at the same speed as the conveyor. The poured molds travel around another turn and thence to a long leg which extends almost across the full width of the foundry, then around another loop and back to the shakeout station. This distance was planned deliberately to afford a long cooling period for the castings.

At the shakeout station shown in Fig. 5, the molds are pushed by a pneumatically operated device on to a vibrating screen made by the Simplicity Engineering Co., Durand, Mich. Sand falls through the screen on to a belt which carries it to the first station in the reconditioning system. The castings slide from the screen on to an apron conveyor from which they are hooked by hand and loaded in trucks for removal to the heat treating furnace. The empty flasks slide on to another table and thence to a conveyor which carries them back to the vicinity of the molding station.

Sand from the shakeout is carried on a belt which discharges over a magnetic pulley to remove metallic inclusions. The sand then falls into a trough type mixer where two revolving screws turn it over (*Please turn to page* 85)

Fig. 7—A gage locates a dry sand core accurately in the center of each mold

Dry Sand Cover Core Cuts Molding Cost

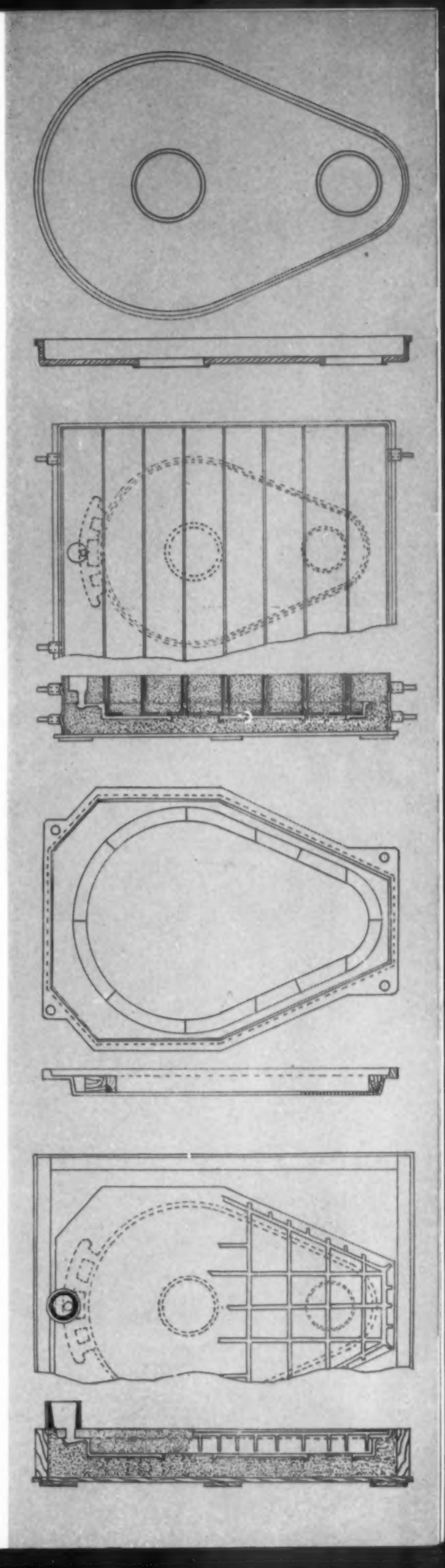
By J. H. EASTHAM

THE dry sand cover core as a partial or complete cope presents many distinct advantages under certain conditions. For example it is a factor in speeding production and reducing the percentage of defective castings in a foundry where the design of the castings is a little too complicated for unskilled labor to handle satisfactorily. Certain types of *boxed out* light castings lend themselves readily to the method. The 54-pound double gear cover casting shown in Fig. 1 may be regarded as a typical example. In the original setup the casting was molded in green sand on a pair of twin jolt rollover machines, one for the drag and one for the cope. The output for a gang of six men was a mold in 14 minutes, or approximately 40 molds per 9-hour shift. This time included pouring operations.

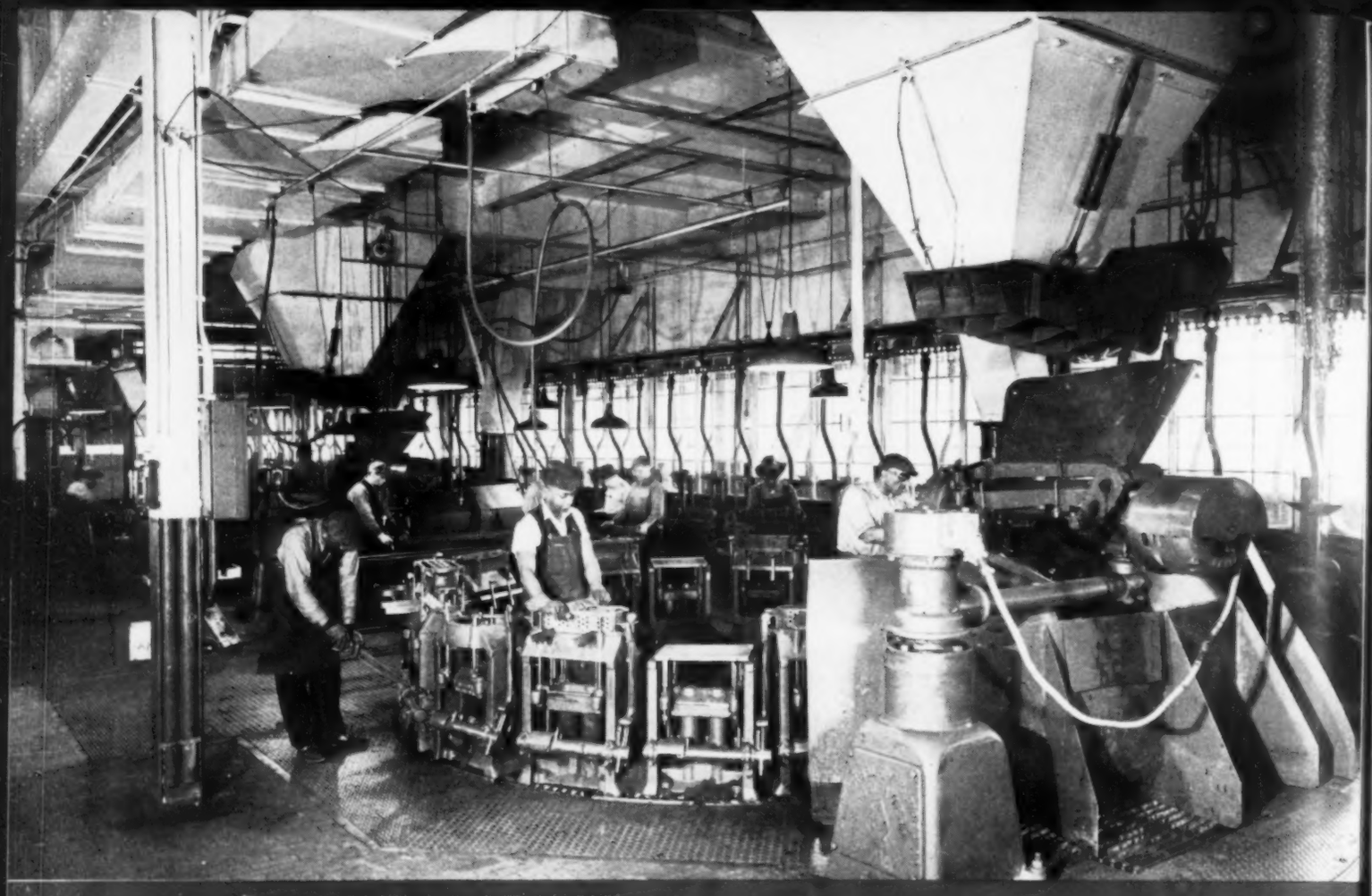
Sand Dropped from Cope Face

The customer provided the pattern equipment, a drag pattern and a cope impression, each on a separate plate. Flasks of the familiar pressed steel design were supplied by the foundryman. As the cross section of the completed mold shows in Fig. 2, the straight barred cope flask, required reinforcement to carry the suspended body of sand or *hang* of the cope. Gaggers had to be placed at intervals over the mold face and continuously around the outline forming the inner wall of the casting. That this procedure carried out by partially skilled men on a piece work basis was not sufficiently fool proof, was evidenced by the scrap returns, which for some time showed a loss on the total output of 10 per cent. This was an unsatisfactory condition, economically as well as from a delivery viewpoint. Sand dropping from the cope caused most of the defects.

To secure adequate financial returns, reduce the scrap and speed production, a change of method became imperative and was accomplished satisfactorily at small cost. A cast iron corebox, Fig. 3, following the inside design of the gear case and extended to an extra depth of $1\frac{3}{4}$-inches, also extended in octagon design to form a core print, was made and mounted on the machine hitherto used to mold the cope. An important feature, popular in many foundries engaged in repetition work, was the insertion of a series of wood blocks around the inner wall of the corebox before the box was filled with core sand and jolted. This loose wood lining provides a clean, unbroken draw (*Please turn to page* 110)



Reading from top to bottom: Fig. 1—Plan view of the casting. Fig. 2—Plan and section of completed mold as made entirely in green sand. Fig. 3—Cast Iron cover corebox lined with wood blocks. Fig. 4—Composite view of mold showing cover core and arbor



AUTO PISTONS CAST HORIZONTALLY

Fig. 1 (Top)—General view of piston molding unit with cope machines in the foreground and pendent conveyor line at the back. Fig. 2 (Bottom)—Flasks pass in rotation under a sand slinger supplied with sand from a large steel hopper attached to the ceiling

MANY years ago when the Tzar of all the Russias was all that the name implied, absolute monarch, dictator, dispenser of the high justice, the middle and the low, the then reigning monarch was asked to indicate his pleasure in regard to the route of the proposed trans-Siberian railroad.

The all-powerful laid a ruler on the map and with a pencil drew a straight line on the fiftieth parallel of north latitude from Tchelyabinsk on the eastern slope of the Urals to Vladivostok on the Pacific, a distance of 4500 miles.

"There's your route, gentlemen" he remarked nonchalantly, "Hop to it."

Just like that. His part of the job was done. He was not even remotely interested in the general features or in the mass of detail incident to pushing the immense undertaking to completion in the comparatively short period of 11 years. One of the great railroading feats of all time, but the only feature of interest at the moment is that the head man said he wanted something done, a seeming impossibility, and his subordinates hopped to it and accomplished the miracle.

Under the merciless spur of competition, standards of every phase of human activity, in-

cluding all manufacturing enterprise, gradually have been raised nearer to the seemingly impossible goal of absolute perfection. The foundry industry is no exception. Standards of excellence in castings, unknown a few years ago, now are demanded in routine production. Voluntarily or involuntarily, heads of manufacturing establishments have no option but to meet demands developed by existing conditions. Under the same conditions their engineering, laboratory and foundry staffs are spurred to meet these demands, demands in some instances that equal those imposed on the ingenuity, resourcefulness, stamina and courage displayed by the men who built the trans-Siberian railroad.

Following an extended period of experimentation the Ford Motor Co., Detroit, has developed and installed at the River Rouge foundry a unique and highly successful method for producing alloy steel, light weight pistons for the Lincoln-Zephyr car.

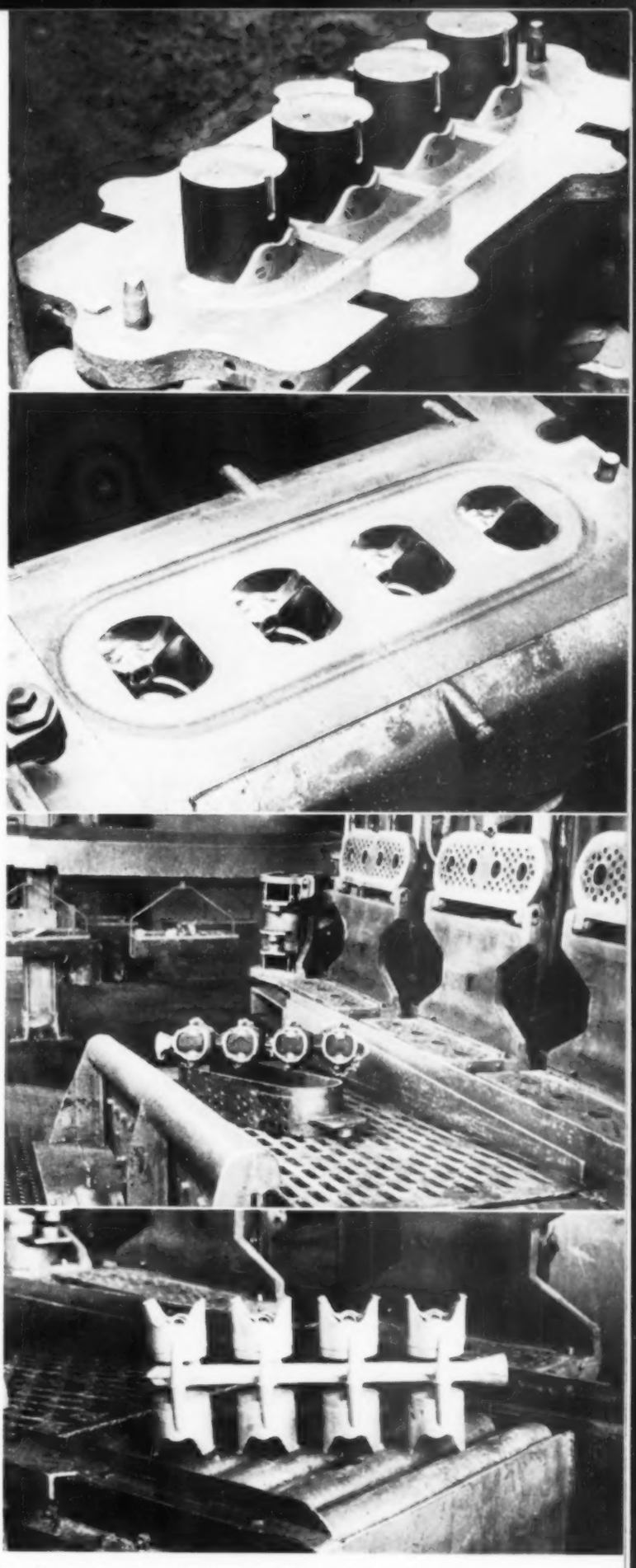
Custom and Tradition Discarded

As with many former methods developed in this remarkable foundry, tradition and custom were viewed with proper respect, but the investigators did not allow these factors to limit their explorations. If the desired result could not be secured by following the broad highway, beaten down by generation after generation of foundrymen, Ford foundry experts cheerfully hopped the fences on either side of the old highway and pursued their investigations down hitherto dim and slightly explored trails and bypaths.

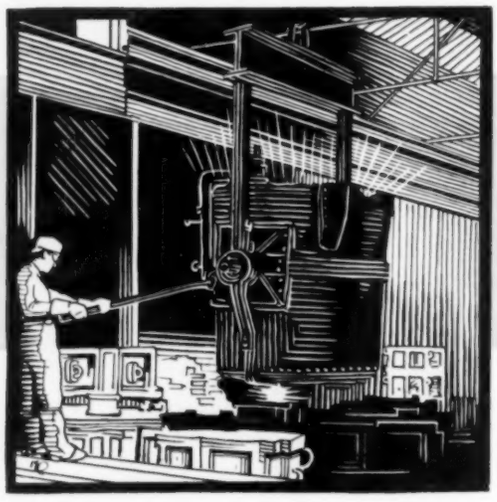
In many instances, to pursue the same simile, they totally ignored all the usual highway signs and warnings and plunged valiantly into an unknown wilderness. Occasionally, the detour eventually brought them back to the main road. In relatively few instances the expedition was abandoned as hopeless. In other instances, and they constitute the majority, an entirely new, shorter and highly improved road was established between two given points.

Foundry readers are familiar with the process developed about two years ago for casting crankshafts in a vertical position in a mold made up of a number of flat sectional cores. Casting of the V-8 cylinder, a highly intricate casting, was simplified to a point where the entire core assembly could be placed in the green sand mold as a unit. A special alloy metal was developed for the crankshaft. Method of melting iron and pouring it into cylinder blocks more nearly approaches perpetual motion than any process adopted up to the present in the foundry industry.

Pistons, light weight alloy steel castings, are poured in all green sand molds, that is the core is green sand as well as the mold. Pistons have been poured in green sand molds before, but—and this constitutes the remarkable feature of the present process—(*Please turn to page* 98)



Reading down, Fig. 3—Cope pattern equipment. Fig. 4—Pattern for combination drag and cores. Fig. 5—The molds are assembled on the fixtures at the right and turned on end. Fig. 6—Group of castings from one mold with runner and gates in place



Questions and Answers

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Temperature Satisfactory If Metal Is Handled Properly

Our company is manufacturing pumps for the government. We are now using a composition of 88 per cent copper; 10 per cent tin; 2 per cent zinc; ¾ per cent nickel. This composition is melted in a coke fire with natural draft. We first put half copper (44 per cent) in the crucible, then add the ¾ per cent nickel; then the rest of the copper (44 per cent); then the 10 per cent tin and last the 2 per cent zinc. This composition is poured at a temperature between 2000 and 2300 degrees Fahr. This is supposed to have a tensile strength of 40,000 pounds. The most we can obtain on government test bars is between 28,000 and 33,000 pounds. These pumps also become porous.

There is little or no trouble in securing satisfactory tests on properly cast 88-10-2. Therefore we are wondering where your trouble may lie, since of course there are many things that influence the results of the production of 88-10-2 plus nickel.

Do you add pure nickel, or do you add an alloy of nickel and copper? The best practice is to use a 50-50 alloy of copper nickel. This insures the solution of the nickel without an excessive temperature being required, or increasing the danger of gasing the alloy by long exposure of the alloy to furnace atmospheres.

Your problem is that of proper melting; although it is, of course complicated further by the presence of nickel, which means an increase in temperature is required for the nickel to be dissolved. The temperature that you indicate as your desired pouring temperature is rather above the average for this alloy, but should give no trouble provided the metal has been properly handled during melting.

We suggest the following practice:

Charge half the copper plus the necessary amount of 50-50 copper nickel alloy and melt under a little charcoal, taking care to see that the melting proceeds as rapidly as possible. Add the balance of the copper as soon as the first charge is melted and as soon as this is melted add the tin and zinc, stirring thoroughly and pour at about 2100 degrees Fahr. The test bars should be cast as to insure proper feeding of the bar by adequate risers. In the navy specifications, the shape of the bar is illustrated and the A. S. T. M. specifications likewise specify the bar known as the Webbert bar, which provides adequate risers for the proper feeding of the bar. These bars, of course, do not check with bars coming from the castings; but it is also true that no two bars coming from two different points in any casting will agree. Therefore, all specifications recognize that the physical properties called for are those indicated by a properly designed bar and they are representative of the material being cast. They thus show the physical properties of such parts of the casting as are properly fed and properly cast.

Demand Requires Two Heats Be Run Daily in Small Cupola

At present we are operating a 28-inch cupola to supply about 8000 pounds of iron per day for 12 molders. We have on hand or in prospect sufficient orders to warrant doubling this output. Is it practicable to put on a night shift and take two heats out of the cupola in the 24 hours.

We assume that your present floor space is occupied fully by the 12 molders and that you will have to use the same floor space, the same sand, the same flasks, molding machines and other equipment for the two shifts. Otherwise we should suggest increasing the floor space and installing a larger cupola, say 36 inches in

diameter which would melt the required amount, 16,000 pounds in less than 2 hours.

However, under the assumed limiting conditions your plan is entirely practicable. On the first day the heat may be run off in the usual manner and the bottom dropped at 4 p. m. By 10 p. m., the cupola should be sufficiently cooled for the cupola tender to enter and make the necessary repairs. To facilitate cooling, the dumped material should be hauled from under the cupola immediately after it drops and the hose may be played on the lining a short time before the man enters. A capable cupola tender will have the fire ready for lighting at 1:00 a. m., and the blast can be put on half or three quarters of an hour later. The bottom will be dropped about 4 a. m. and the same program may be repeated on the following day. This is based on the assumption that your present melting practice is satisfactory and that the bottom drops clean, thus involving a minimum amount of chipping and daubing of the lining.

Hot Iron Is Required To Pour Sanitary Ware Castings

We are melting 45 tons per day in a cupola lined to 42 inches and the bottom drops clean. The metal poured into bath tubs and other sanitary ware castings conforms to the following approximate analysis: Silicon 2.20 per cent, sulphur 0.09 per cent, phosphorus 0.67 per cent, manganese 0.43 per cent, total carbon 3.34 per cent, combined carbon 0.17 per cent. Despite the fact that the metal appears white hot at the spout a metallurgist who checked the temperature with an optical pyrometer reported that the spout temperature was 2240 degrees Fahr., and that 40 seconds later at the pouring floor the temperature was 2160 degrees Fahr. This metal was poured into a 20 x 30-inch sink and the casting was satisfactory in every respect. We shall appreciate your opinion on the analysis of the iron and on the temperature report.

The analysis you give for the iron is fairly satisfactory for enameled sanitary ware, although 2.20 per cent silicon is just about on the danger line. You would avoid several hazards by raising the silicon content to approximately 2.35 per cent. The other elements may vary through rather a wide range without adversely affecting the suitability of the iron for this particular purpose

There is something radically wrong either with the instrument, the operator, or the temperature reading you quote. Gray iron showing a temperature of 2240 degrees Fahr., at the spout and 2160 degrees Fahr., leaving the ladle would be just about liquid enough to pour into a pig bed. In fact we should expect a considerable amount to remain as a skull in the ladle. The fact that the cupola drops clean and that you melt 45 tons of iron per day in a 42-inch cupola would seem to indicate that your melting practice is satisfactory and that the iron is melted hot and clean. As a matter of fact your practice is rather unusual in that it involves running a 42-inch cupola continuously for between 7 and 8 hours per day.

Finer Grade of Molding Sand May Eliminate Pinhole Trouble

We are sending a pressure plate casting for a clutch. One face is machined, and you will note that several pinholes are present. That condition also may be observed on the unmachined portion particularly where the lugs join the casting. Can you tell us what causes those holes?

Examination of the small holes comparatively few in number, reveals that they have dull, oxidized surfaces. This indicates that the cause of the trouble is not in the metal itself. Further examination of the castings on unmachined portion shows that a comparatively coarse molding sand is employed as the surfaces are unusually rough for that particular type of casting.

The pinholes previously mentioned undoubtedly are due to a comparatively slight fluttering caused by sand conditions. Coarse sand, unless handled by molders familiar with its characteristics, often leads to troubles encountered from too much moisture or ramming too hard, and occasionally from poor distribution of the

Pouring metal for a 150,000 pound iron casting at the foundry of the Toledo Machine & Tool Co., Toledo, O. It will be the crown of a metal press which will weigh more than a million pounds when finished

bonding material resulting from insufficient mixing or cutting over the sand. In our opinion your trouble can be eliminated by using a little finer grade of sand which not only will provide a better surface on the castings, but also will eliminate the tendency of the molders to use more water than necessary in tempering, or ramming a little too hard.

Describe Making Of Holloware Castings

Can you refer me to any literature covering the production of cast iron cooking utensils.

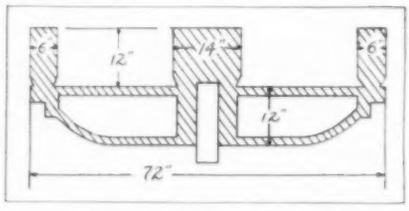
A fairly comprehensive article on this subject appeared in the April 1 and April 15, 1921, issues of THE FOUNDRY. The first part of the article dealt with the molding and melting features, while the second covered equipment and methods employed in grinding and finishing the castings. The subject was covered briefly in the question and answer department of THE FOUNDRY in the May 1, 1927 and the March 1, 1928 issues. An article dealing with the methods pursued in Chinese foundries appeared in March, 15, 1926. Method and equipment employed in the production of cast iron tea kettles were described and illustrated in June, 1898 issue. An illustrated article showing machines and pattern equipment for making cast iron pots in Germany foundry was presented in the September 1908 issue of THE FOUNDRY. In this method the mold is split vertically and two halves are moved toward each other horizontally to embrace the bulging green sand core standing on a base.

Large Riser Will Eliminate Rod Feeding

We make a number of marine pistons 72 inches diameter, 12 inches thick through the center, with a central hub 12 inches in diameter. The body of the piston is cored in the usual manner and has a 4-inch core through the hub. Metal on top and bottom plates is 1⅝ inches thick, 3½ inches in the outside wall and 4 inches thick around the center core in the hub. The casting is gated on the hub and later fed with a rod through a 4-inch diameter riser. The feeding job is long and hot to get a solid casting. Can you suggest an easier and better method for securing a good casting.

In addition to the heat and discomfort incident to any rod feeding process, we doubt the possibility of securing a solid steam tight casting by feeding through a single 4-inch riser on the hub. If the casting was broken you probably would find either actual shrinkage cavities or porous areas in the metal forming the outer wall opposite each web between the chamber cores.

The best way to secure a solid casting of this type is to take a leaf out of the steel foundryman's book. Assuming that the chamber core is in six sections, place a 6-inch diameter riser 12 inches high over each web near the rim. Place a 14-inch diameter riser 12 inches high on the hub. Cover this central riser with a cake core pierced with six ¾-inch pop gates on a 9-inch diameter circle to be fed from a long basin extending



Casting is poured through ring of pop gates on central riser

to the edge of the cope. These risers will feed the casting adequately without any rod pumping.

Use of Iron Ring Should Eliminate Defect

We are having difficulty with a heavy hub casting. The hub is 18-inches high and 23-inches in diameter with a 2-inch hole extending approximately 2/3 of the height, and the remaining third of the distance the hole takes the form of a truncated cone about 4-inches in diameter. Two 7-inch risers are used but shrinkage voids occurred approximately in the center adjacent to the core. To eliminate that trouble we tried placing a heavy metal ring in the center and pouring molten iron around it. The ring was placed in the mold while red hot, after it had been sand-blasted but the results were not entirely satisfactory. Can you make any suggestions on how to obtain a solid casting?

While you mention that you use 7-inch risers on your hub castings, there is no indication whether that refers to height, or the diameter at the top of the riser or the diameter at the bottom of the riser. First, if the risers are 7-inches in diameter at the bottom, that is, where they attach to the castings, and they should be about that size, we cannot figure out why you have any shrinkage. Probably instead of shrinkage, the trouble might be caused by blows from the core due to lack of proper venting of the core to the surface of the mold.

Use of the iron ring, or as it more commonly is termed, a dutchman, on the inside of the mold should eliminate the shrinkage. However, it is not necessary to have it red hot when placed in the mold. Just have it warm enough so that moisture from the mold will not precipitate. Of course, it is essential that the dutchman be absolutely clean to prevent any spalling off.

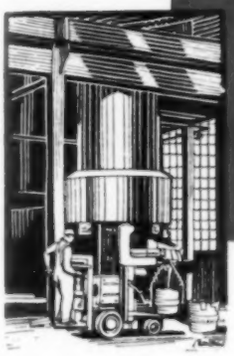
First Iron from Small Cupola Comes Cold

We have a small cupola lined to 18 inches and equipped with two tuyeres, 4 x 9 inches, set 19 inches above the sand bottom. The charge is made up of 175 pounds of iron broken small, 25 pounds coke and 6 pounds limestone. The coke bed extends to 40 inches above the tuyeres. The first 500 pounds of iron from this cupola is cold, thereafter it becomes hotter. We shall appreciate your opinion on how to improve this condition.

Any one of several or a combination of factors may be responsible for cold iron during the first part of the heat. For example you may be using a low grade coke, the volume of air delivered by the fan may be too high or too low, the bed coke may not be burned properly, the sand bed may be too hard or too wet.

Assuming that your fan is delivering about 500 cubic feet of air per minute, your iron, coke and limestone combination is satisfactory for a melting speed of approximately 2000 pounds per hour. In breaking in a new cupola close observation and a certain amount of experimentation are required to secure the best results. Where a man has been accustomed to working with a large cupola, he may not make allowance for the fact that the coke bed in a small cupola sinks much faster than the bed in a larger cupola. Thus you may have coke extending 40 inches above the tuyeres before charging commences and have it drop down to only a few inches above the tuyeres before the first charge is melted.

With other conditions satisfactory an excessive blast will cause the first iron to come cold. Later as the openings in front of the tuyeres become partly blocked the volume of blast is reduced and the temperature inside the cupola rises. As a preliminary to your investigation, we suggest you light the fire about 1 hour before charging time. Add coke from time to time so that the coke is red to a point 40 inches above the tuyeres. Then add the usual charge of 25 pounds of coke and the first charge of iron. Fill the cupola to the charging door and allow it to stand for ½ hour before starting the fan.



Viewing Foundry Developments . . . AT SHORT RANGE

PRESENCE of dross in brass and bronze castings frequently presents a puzzling problem. A careful check on the many factors involved, sand, metal, molding, melting, usually but not always reveals the cause. One foundryman finally traced the trouble to the method used in drying and heating his ladles with a down pointing oil jet. The oil was not atomized perfectly and a certain amount soaked into the lining of the ladle unconsumed. By inverting the ladle over the flame he solved the problem. Later he erected two forks over the mouth of an upright type oil burning melting furnace and heated his ladles by the exhaust flame from the furnace. He had no further trouble.

* * *

Manganese has a relatively small influence on the working properties of a 5 per cent tin bronze. As much as 6 per cent manganese must be added before an appreciable embrittling effect is apparent. Manganese increases the softening temperature of the tin bronzes.

* * *

A PROMINENT foundryman in the northwest has developed a special type of perforated grate bar for use under boilers where sawdust and lumber refuse are used for fuel. The bar is cast in two parts, the upper part containing the air openings, and the lower part a suitable cavity for the enclosure of a pipe coil. In service, water is circulated from a header through all the bars in the firebox. It is claimed that the bars show approximately five times the life of the ordinary bar.

* * *

An automobile manufacturer has found the greatest problem in using super-heated iron for cylinders without the addition of alloy is to melt iron hot enough to break down the graphite, and pour hot enough to obtain fluidity; at the same time keeping the large bosses from shrinking due to liquid shrinkage. With the use of alloys that manufacturer has found it possible to produce more satisfactory castings by eliminating most of the hazards.

* * *

Confronted with the necessity of collecting a larger supply of molten metal in the well of a small cupola an ingenious west coast foundryman solved the problem by lifting the existing shell and lining from the foundation plate and inserting a cast iron ring 5 inches in height between the shell and the bottom plate. The ring then was lined with brick to conform with the remainder of the lining in the cupola.

* * *

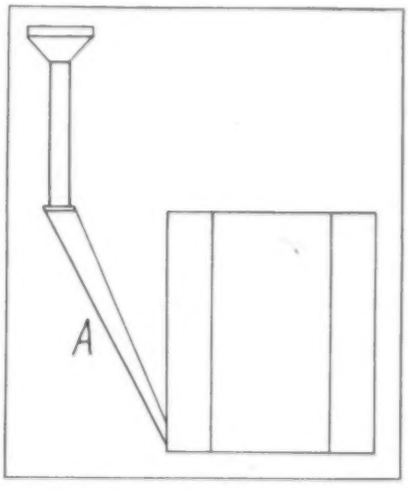
LARGE increases in ductility of aluminum-copper alloys containing from 2 to 12 per cent copper can be obtained through the addition of 0.005 to 0.10 per cent tin provided the alloy is free from magnesium. A patent describing the development states that a casting alloy containing 4.25 per cent copper, heat treated at 515 degrees Fahr. for 16 hours had an elongation of 5 per cent. Addition of 0.03 per cent with the same treatment increased the elongation to 8.4 per cent. An alloy containing 4 per cent copper and 5 per cent silicon with the same heat treatment had its elongation increased from 1.6 per cent to 5.4 per cent by the addition of 0.05 per cent tin.

* * *

Addition of boron to cast iron makes it extremely hard and abrasion resistant according to a recent patent. The product is designed for lining steel tubes, and as described the addition of boron may be accomplished by melting 75 pounds of pig iron containing 3 or more per cent carbon, 2 to 4 per cent silicon and phosphorus preferably under 0.05 but not more than 0.10 per cent, in a No. 50 crucible with 5 pounds of borax. The crucible is sealed with a top containing a small vent hole. Melting takes about 1¾ hours in an oil-fired furnace, and the resulting alloy contains from 3 to 3.30 per cent carbon, 1 to 1.15 per cent boron and 1 to 1.5 per cent silicon. With 1.02 per cent boron in the iron the brinell hardness is 705 while with 1.7 per cent the hardness is 800 in the material as cast.

* * *

The method practiced for making molds at the copper smelters might be adopted under certain conditions in other foundries. In some respects the method may be compared to that practiced in glass factories and other places where plastic and semiplastic materials are pressed into shape. An open top frame is filled with molten copper. When the copper begins to skim over the top, a hydraulic press plate bearing a number of metal patterns is lowered until the patterns enter the molten metal to the desired depth. A stream of water flows through the patterns which are allowed to remain in place until the copper solidifies. Then they are extracted. The pattern parts are coated with bone ash. In a few minutes the sides and ends of the mold are loosed and the red hot copper mold casting weighing approximately 5000 pounds is removed. Later it is placed in service on a large turntable which carries a battery of similar molds under the multilip ladles which receive the copper from the melting furnace.



The metal gate pattern A is rammed up with the pattern in the drag

Paul D. Merica

Carl Stenberg

Ernest F. Fisher

Men of Industry

Ernest F. Fisher has been appointed superintendent and assistant manager of the Illinois Foundry Co., Springfield, Ill. Mr. Fisher graduated from Carnegie Institute of Technology in 1905 and entered the service of Westinghouse Electric & Mfg. Co., Philadelphia, in that year. From the years 1909 to 1912, he was employed by several firms in the Pittsburgh area, including the Pittsburgh Steel Foundry and the Union Steel Castings Co.

In June, 1912, Mr. Fisher became connected with the Carnegie Steel Co. In March, 1913, he returned to the Westinghouse company and spent a year in the experimental department, in the development of steam flow meters. From 1914 to 1916 he traveled throughout Europe, and in May of the latter year was re-employed by the Westinghouse Company, acting in the capacity of traveling inspection engineer. In 1918, Mr. Fisher became foundry engineer of the South Philadelphia works of that company, resigned in 1920, and entered the employ of the Fisher Machine Works Co., Leavenworth, Kans.

❦ ❦ ❦

T. E. McFall, Muskegon, Mich., has been elected president of the newly formed Muskegon Piston Ring Co. John E. Johnson is vice president in charge of the Muskegon division; Harold G. Vaughan, vice president in charge of the Sparta, Mich., division; and George W. Lundee, Muskegon, treasurer of the company. Directors include Messrs. McFall, Johnson, Vaughan, Harold Thurston, Wade E. Sakner, Samuel M. Goldman, and Samuel Ungerleider.

Detroit Plant Visit

Plant visitation will be a feature of the A.F.A. Convention program at Detroit. The only organized group visits, arranged by the Detroit committee, will be held simultaneously on Monday, May 4. One trip will be to the Great Lakes Steel Corp. and another to the Ford Motor Co. Buses will leave the Statler and Book-Cadillac at 10 a.m. and in both cases, lunch will be served during the trip. Other plants will be open for inspection during the convention. Information will be available at the registration desk in Convention Hall.

❦ ❦ ❦

Carl Stenberg recently has moved his foundry, operated as Stenberg's Foundry, to larger quarters at 4228 Whiteside avenue, Los Angeles. New equipment has been installed. The foundry produces bearing metal, brass, bronze and aluminum castings, match plates and metal patterns.

Mr. Stenberg served his time as an apprentice in Norway, Sweden and later Denmark. He also worked in Germany. For some time after coming to the United States he was connected in various capacities with the American Brake Shoe & Foundry Co. Prior to locating in Los Angeles, Mr. Stenberg was connected with the Joshua Hendy Iron Works, Sunnyvale, Calif.

❦ ❦ ❦

Dr. John F. Thompson, for the past five years vice president of the International Nickel Co. of Canada Ltd., Toronto, Ont., has been elected to the newly created post of executive vice president.

Dr. Paul D. Merica, formerly assistant to the president; Donald Macaskill, general manager in charge of Canadian operations; and D. Owen Evans, delegate director of Mond Nickel Co. Ltd., have been elected vice presidents of the company.

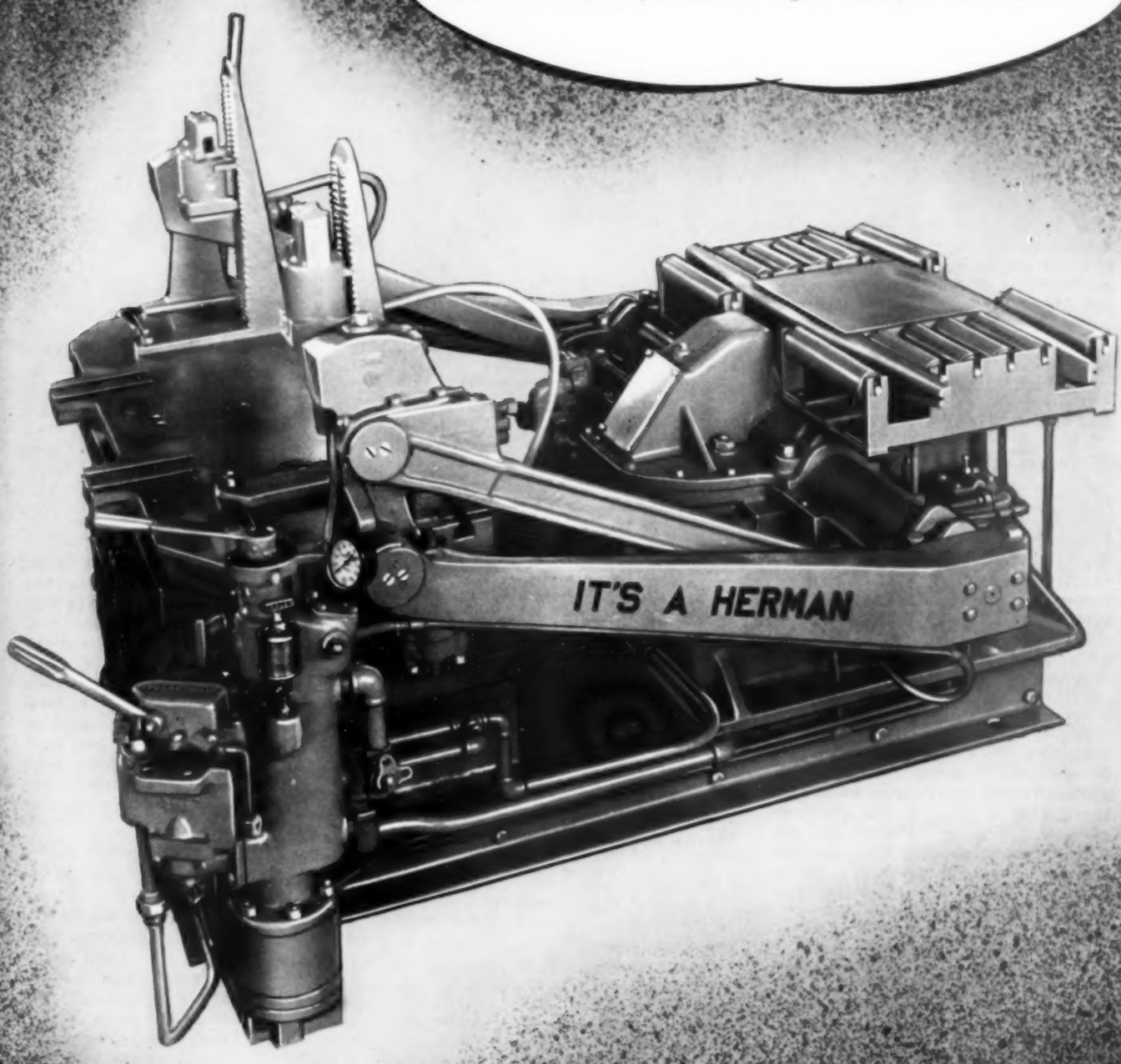
❦ ❦ ❦

Alfred Kauffmann has been elected president of the Link-Belt Co., Chicago, succeeding George B. Torrence, who has resigned. Mr. Kauffmann has been identified with Link Belt for over 35 years, starting work as a draftsman. He served as president from

(*Continued on page* 58)

WE INVITE YOU

We invite all our foundry friends, old and new, to visit our space, 601, 602, and 603. ● Herman's famous trio of pitless type, High Production Jarr Rollover and Pattern Drawing Machines, the 750 lb. capacity, the 1,500 lb. capacity, and the 4,000 lb. capacity, will be demonstrated for you. ● Remember it makes no difference to a Herman whether your work is large or small, it will do it better.



HERMAN PNEUMATIC MACHINE CO.

PITTSBURGH, PA.

(*Concluded from page* 56)

1924 to 1932. In the latter year, Mr. Torrence succeeded him to the presidency, and for the past four years Mr. Kauffmann has been vice president in charge of operations in the Chicago district. Mr. Torrence has terminated 25 years with the company.

B. F. MERCER has become affiliated with the Pittsburgh Steel Foundry Corp., Glassport, Pa. He was formerly associated with the National-Erie Corp., Erie, Pa.

Henry Jenson, foundry superintendent of the General Electric Co., West Lynn, Mass., addressed the Connecticut Foundrymen's association March 20, on "General Foundry Practice." Preceded by a dinner, the meeting was held at the Home Club, Meriden, Conn.

E. T. BENNINGTON, formerly connected with the Cleveland Tramrail Co., Cleveland, has joined the Chicago office of the Harnischferger Corp., as a sales engineer specializing in cranes and hoists.

CALVIN P. WOLFE recently has been made superintendent, Miller Foundry Co., Columbus, O. During the past 20 years, Mr. Wolfe has been superintendent of several foundries in the Milwaukee district.

C. PAUL CLARK, formerly general manager of Clark Bros. Co., Olean, N. Y., manufacturer of oil and gas engines, has been elected president to succeed Joseph S. Reid, recently deceased.

Other appointments include F. H. LIGHT as secretary-treasurer, and J. B. O'CONNER as vice president.

PETER GREEK, 851 Grand avenue, Rochester, N. Y., recently celebrated his eightieth birthday. He served his apprenticeship as an iron molder at the age of 10 in Erie, Pa. He then came to Rochester to work for the William H. Cheney foundry, later going to the Gleason Works Inc. He is a nightwatchman at the present time for the F. L. Heughes & Co. Inc.

M. ROGERS has been named general factory manager of Caterpillar Tractor Co., Peoria, Ill. He entered the business in 1922 as foreman of the turret lathe department of the C. L. Best Tractor Co., a predecessor of the Caterpillar Co. In 1927, two years after the formation of the present company, he was named assistant factory manager of the Peoria tractor plant, and in 1929 was appointed factory manager, which position he held until his recent promotion.

JAMES R. MUNROE has been appointed factory manager of the tractor division, succeeding Mr. Rogers. Mr. Munroe enrolled for the four-year apprentice training course at the C. L. Best Tractor Co. in 1918, and upon completion of this work was employed in the tool room. He was made foreman of this department in 1925 and later was put in charge of the heat-treating department in the San Leandro, Calif., factory. He was transferred to Peoria in 1931 as superintendent of the new diesel engine assembly line and assistant superintendent of tractor erection, a position he held until the time of his latest advancement.

M. Rogers

H. L. GEIGER has been appointed field representative in the Chicago territory, for International Nickel Co. Inc., New York. He will have offices at 333 North Michigan avenue, Chicago.

A. G. ZIMA has been appointed field representative for the Los Angeles territory, with offices at 705 Petroleum Securities building, Olympic and Flower streets, Los Angeles.

DONALD P. HESS, executive assistant to the president, Timken Roller Bearing Co., Canton, O., has resigned, to become vice president and director of the Ebco Mfg. Co., Columbus, O. Mr. Hess has been well known in the manufacturing and sales divisions of the bearing industry for many years, becoming associated with the Timken company in 1919 as assistant factory manager of the main plant in Canton. In 1921 he was transferred to the Columbus plant as general manager in charge of all operations. In 1927 he returned to the main plant to take up his present duties, besides taking charge of all foreign operations of the organization.

ALBERT B. HOFFMAN has been elected president of the Blackmer Rotary Pump Co., Grand Rapids, Mich. He formerly was chairman of the board of Detroit Sulphite Pulp & Paper Co., and vice president of the Detroit Trust Co. Mr. Hoffman is an engineer with wide experience in manufacturing, sale, and business administration.

JOSEPH F. SWEENEY has become connected with the Federated Metals Corp., subsidiary of American Smelting & Refining Co., New York, as purchaser of nickel scrap, nickel alloys, and nickel bearing material. Mr. Sweeney formerly was connected with the International Nickel Co., Allegheny Steel Co., Michiana Products Corp., H. Baker & Co., and Cosmo Metal Alloys Corp.

STEPHEN F. BRIGGS, Briggs & Stratton Corp., Milwaukee, who recently acquired controlling interest in the Johnson Motor Co., Waukegan, Ill., maker of outboard engines, has been elected president of the Johnson company, to succeed H. G. DELABAR. JOSEPH RAYNIAK, P. A. TANNER, and E. H. MILLET have been elected vice presidents, and C. P. ROSBERG, secretary and treasurer.

E. J. HEDLUND, formerly works manager of the Erie Malleable Iron Co., and E. A. STEINEFURTH, formerly general manager, Cascade Foundry Co., both of Erie, Pa., have organized the Hedlund-Steinefurth Foundry Co. and have taken over the plant of the Sims Co., Nineteenth & Whitley avenue, Erie. The new firm will manufacture gray iron and special alloy iron castings in the medium heavy range from 25 pounds to 4 tons in weight. The Sims plant has been idle for the past two years.

L. B. BREWSTER has been appointed Cleveland district sales engineer of the W. W. Sly Mfg. Co., Cleveland. Mr. Brewster has had extensive experience as a practical engineer and as manager and operator of various foundry departments. For several years he was engineer for the Farrel Machine & Foundry Co., and assistant foundry manager and engineer of the York Ice Machine Co. He also has been associated with the Cleveland Co-operative Stove Co., Hamilton Foundry & Machine Co., and Fox Furnace Co.

MOLY helps to cut finishing costs

TAKE gears, for example: If in their production the distortion can be so minimized—and uniformly predicted—as to eliminate the necessity of grinding before lapping, the cost of one operation is saved.

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Our files may contain experiences or case histories paralleling some particular problem of your own. These data, as well as the co-operation of our experimental laboratory, are at your disposal. Meantime, our technical book, "Molybdenum," and our periodical news-sheet, "The Moly Matrix," will gladly be sent you on request.

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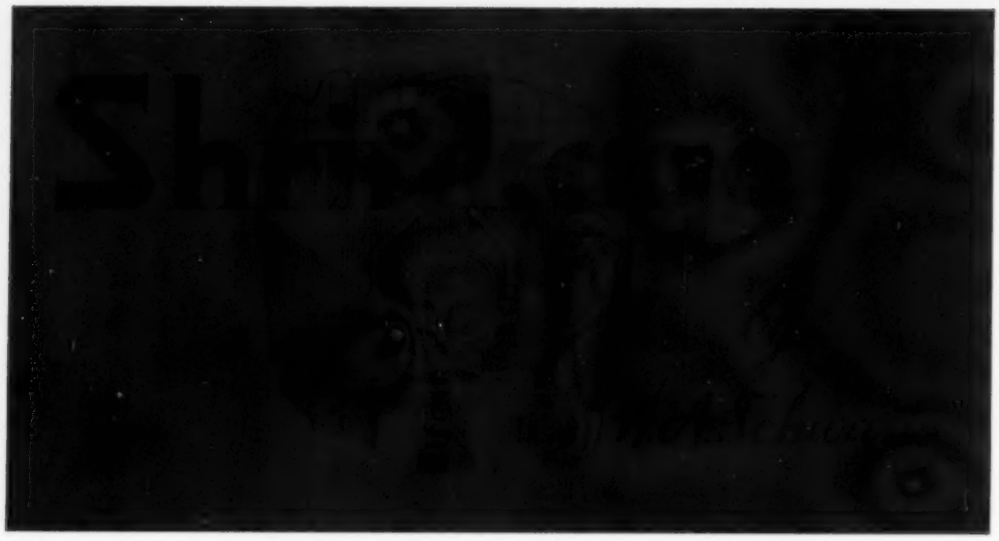


Sixth Installment

Problem 14.

CONSIDER the relative heights and diameters of casting and feeder in order that there may be no *draw* i.e. void in the casting below the lower level of the feeder.

If R_1 and H_1 be the radius and height of a feeder standing axially above a casting of radius R_2 and height H_2 an equation can be derived[42] for the form of the funnel shaped upper surface of the feeder as follows:

$$r_1^{2\phi} = \frac{R_1^{2\phi}\left(H_2\frac{R_2}{R_1} + h_1\right)}{H_2\frac{R_2}{R_1} + H_1} \qquad (10)$$

where r_1 is the radius of this surface at distance h_1 above the feeder base.

Now if the depression shall not extend into the casting itself, no values of h_1 which are negative are permissible.[44] The distance to which freezing has penetrated in the feeder when the casting has frozen solid can be computed.[45] This distance merely determines the value which r_1 has at the moment when the freezing is complete and we may say

$$R_1^2 - R_1 R_2 = \frac{R_1^{2\phi}\left(H_2\frac{R_2}{R_1} + h_1\right)}{H_2\frac{R_2}{R_1} + H_1}$$

and since h_1 is not to be negative,

$$(R_1^2 - R_1 R_2)\left(H_2\frac{R_2}{R_1} + H_1\right) \ll R_1^{2\phi}\left(H_2\frac{R_2}{R_1}\right)$$

This inequality can be simplified to read

$$H_1 \ll \left(\frac{R_1^{2\phi-1}}{R_1 - R_2} - \frac{R_2}{R_1}\right) H_2 \qquad (11)$$

From this the necessary height of feeder, H_1, can be calculated knowing the other values, or alternatively, the necessary radius if the height is given. It may be noted that the result is actually independent of the question whether the cylindrical casting stands vertically or not for the upper surface of the frozen feeder never penetrates it.

Allusion has been made previously to the fact that piping will not go to the bottom of a cylindrical casting if the bottom metal has cooled off during pouring so that freezing takes place first at the bottom. We have come here to a convenient place to examine into this phenomenon further. We do so under the assumption that there is no conduction of heat up and down through the casting in the direction of its axes. This assumption is not realizable in practice for we also assume that the temperature across an entire horizontal section of the casting is uniform. For the former assumption the metal must have zero thermal conductivity, for the latter infinity. We will get as the result of our discussion therefore a limiting condition which in practice never will be realized but only approached, just as the assumption that a mold is filled instantaneously with metal all at one temperature also is not realized. The real piping to be expected will in fact fall between the results of the calculation based on the two different simplifying assumptions. Further precision can be had only as the result of still greater complexity of treatment.

If a vertical cylindrical mold have iron poured into it slowly from above, then the bottom layers will cool while successive layers are added above. If the pouring be slow enough in relation to the temperature and cooling rate, there will finally be three layers. One at the bottom will be completely solid, one at the top completely liquid and an intermediate layer, of constant temperature throughout (for a metal having a sharp freezing point) which is partly solid and partly liquid. The thickness of solid metal around the circumference will vary from zero at the top of this layer to the radius of the cylinder at the bottom. The boundary between the solid and liquid will be funnel shaped though this is not to say that it will actually be conical. Its shape could be calculated but is for the present purpose not important.

As the liquid stands in the mold and cools this funnel shaped boundary moves upward in the mold since each layer of iron traverses the same thermal history as those below it but at a later time. Now evidently the upper surface will be horizontal so long as it is all liquid, that is until the edge of the surface separating the liquid and solid phases has progressed to the surface of the metal. Thereafter piping will begin as already discussed in connection with Fig. 26.

Since the temperature is uniform in the partially frozen zone, the rate of heat loss per unit of area is the same throughout its circumferential outer surface. Consequently the amount of metal freezing in an extremely short space of time is the same at all levels and the mathematical treatment of the problem becomes exactly that of footnote 42. It follows that the pipe will again extend to the bottom of the cylinder whose freezing is under consideration, here the cylinder in which the metal is partly solid and partly liquid. This problem becomes merely a question of computing the height of this cylinder.

Problem 15.

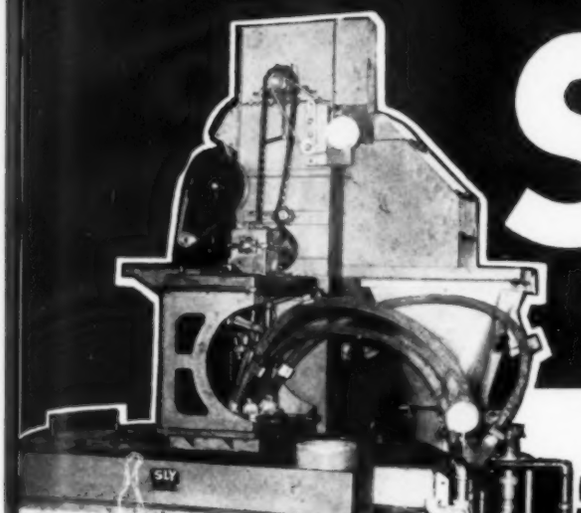
Compute in terms of the necessary physical constants the height of the partially frozen layer of a given metal poured

(*Continued on page* 62)

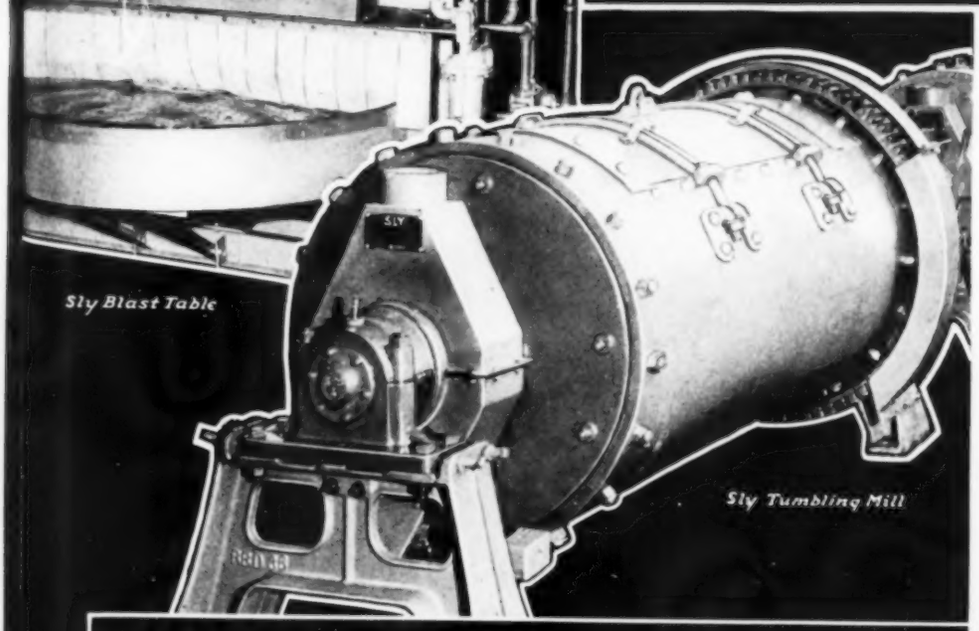
Footnote references will be found at the end of this installment starting on page 62.

SLY

CLEANING EQUIPMENT



Sly Blast Table



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(*Continued from page 60*)

into a vertical cylindrical casting of given dimensions, in a mold of given size and material.

Let V be the rate of flow (in units of volume per unit time). Let the casting have a radius of R and be surrounded by a layer of sand of thickness, d, whose thermal conductivity is k. Let the density of the metal be ρ (*ro*) and its freezing point, *measured above the outside temperature of the mold*, be θ (theta). Its latent heat of fusion is L.

The mean cross section of the sand surrounding an element of unit height of the casting will be a cylindrical shell whose area is

$$\frac{2\pi[R+(R+d)]}{2} = \pi(2R+d).$$

The heat conducted through the cylinder of sand surrounding a unit height of casting at the freezing point will be

$$\frac{\pi\theta k(2R+d)}{d}$$

The heat content corresponding to the freezing of unit height of the cylindrical casting will be

$$\pi R^2 L\rho$$

and the time to freeze from the moment when freezing begins till it ends is

$$\frac{\pi\rho L R^2 d}{\theta\pi k(2R+d)} = \frac{\rho L R^2 d}{\theta k(2R+d)}$$

In this time the volume of iron poured will be

$$\frac{\rho L R^2 d V}{\theta k(2R+d)}$$

which will fill the cylinder to a depth

$$\frac{\rho L R^2 d V}{\theta k(2R+d)\pi R^2} = \frac{\rho L V d}{\theta\pi k(2R+d)}.$$

This distance is then the difference in level, corresponding to the difference in time, between the condition where freezing just starts at the edges and where it has just been completed. It thus represents the value of H in formula (9) applicable to this particular problem. Note that the *depth* of piping now bears no relation to the height of the ingot or casting providing only that this be as great as the "H" computed above and bears also no relation to the coefficient of contraction on freezing, ϕ. Also that this depth can be reduced, in theory at least, to any desired amount by pouring sufficiently slowly, i.e., by a decrease in V.

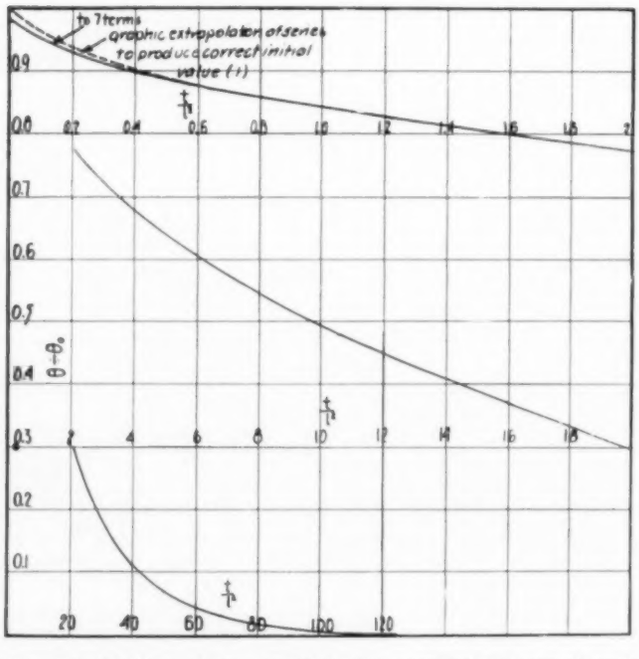

Fig. 27—Values, shown graphically, computed from length of cylinder and its diffusivity and elapsed time

The problem relating to piping have been solved for a material having the freezing conditions of a pure metal or eutectic. For alloys having a freezing range, the same methods can apply if the coefficient, ϕ, is modified to be instead of the mere coefficient of contraction, on freezing of the metal, a factor which includes all the changes of density between the solid and liquid phases. We can determine the density of the liquid metal having the composition in equilibrium with solid metal at a given temperature and also the density of the solid metal. If we let ϕ represent the ratio of the difference in specific volumes[47] to the specific volume of the liquid the value will in general be approximately constant at least over the freezing range, especially if that be short. Using this value of ϕ we may then proceed as before more especially since we are usually more interested in the *depth* of the pipe than in its total volume. The depth is shown to be independent of ϕ in general.

For the benefit of those who may wish to consider how long a temperature difference can exist between the top and bottom of such a casting as our cylindrical ingot, assuming that it did not lose heat from its sides, a simple expression can be derived by rather complicated means[47] given the temperature difference, ϕ, of the two ends of the casting in terms of the original temperature difference, ϕ_0, the length of the casting's height, l, the diffusivity of the metal, h^2, whose value for various metals already has been given frequently and the time. Temperatures are as usual in degrees Cent. and distances in centimeters ($1\ cm = 0.4$ inch).

This expression is

$$\theta = \frac{8}{\pi^2}\left(e^{\frac{-h^2\pi^2 t}{l^2}} + \frac{1}{9}e^{\frac{-h^2\pi^2 t}{l^2}}\right)\theta_0$$

$$= .81\left(e^{\frac{-h^2\pi^2 t}{l^2}} + \frac{1}{9}e^{\frac{-h^2\pi^2 t}{l^2}}\right)\theta_0 \qquad (12)$$

The values of the two expressions in the parenthesis could be found readily by looking up the values of $\frac{h^2\pi^2 t}{l^2}$ and 9 times this value in a table of exponential functions. For convenience the value of $\frac{\theta}{\theta_0}$ is given graphically in Fig. 27 for various values of

$$\frac{h^2\pi^2 t}{l^2}$$

which values are to be computed from the length of the cylinder and its diffusivity and from the elapsed time.

The expression given previously gives too small a value of θ which will balance an error in the assumption due to the fact that the hotter end of the specimen cools faster than the cold[48].

The same result as is attained by pouring a vertical ingot slowly also can be had by filling an ingot, smaller at the bottom than at the top, with metal of uniform temperature and depending for the (vertical) temperature gradients on the difference in cooling rate. By reasoning exactly parallel to that underlying problem 15, the depth of pipe in a tapered ingot is determined by the distance below the top of the ingot to which the ingot is frozen *solid* when the upper layer begins to freeze. Here, as in all preceding cases, the exposed surface is not supposed to bridge over.

(*To Be Continued*)

[47] Let R_1 and H_1 be the radius and height of the upper cylinder and R_2 and H_2 the radius and height of the lower cylinder. Let r_1 and r_2 be radius of the boundary between liquid and solid at a given instant. Let a layer, dr_1 in thickness freeze in an infinitesimal period

(*Concluded on page 66*)

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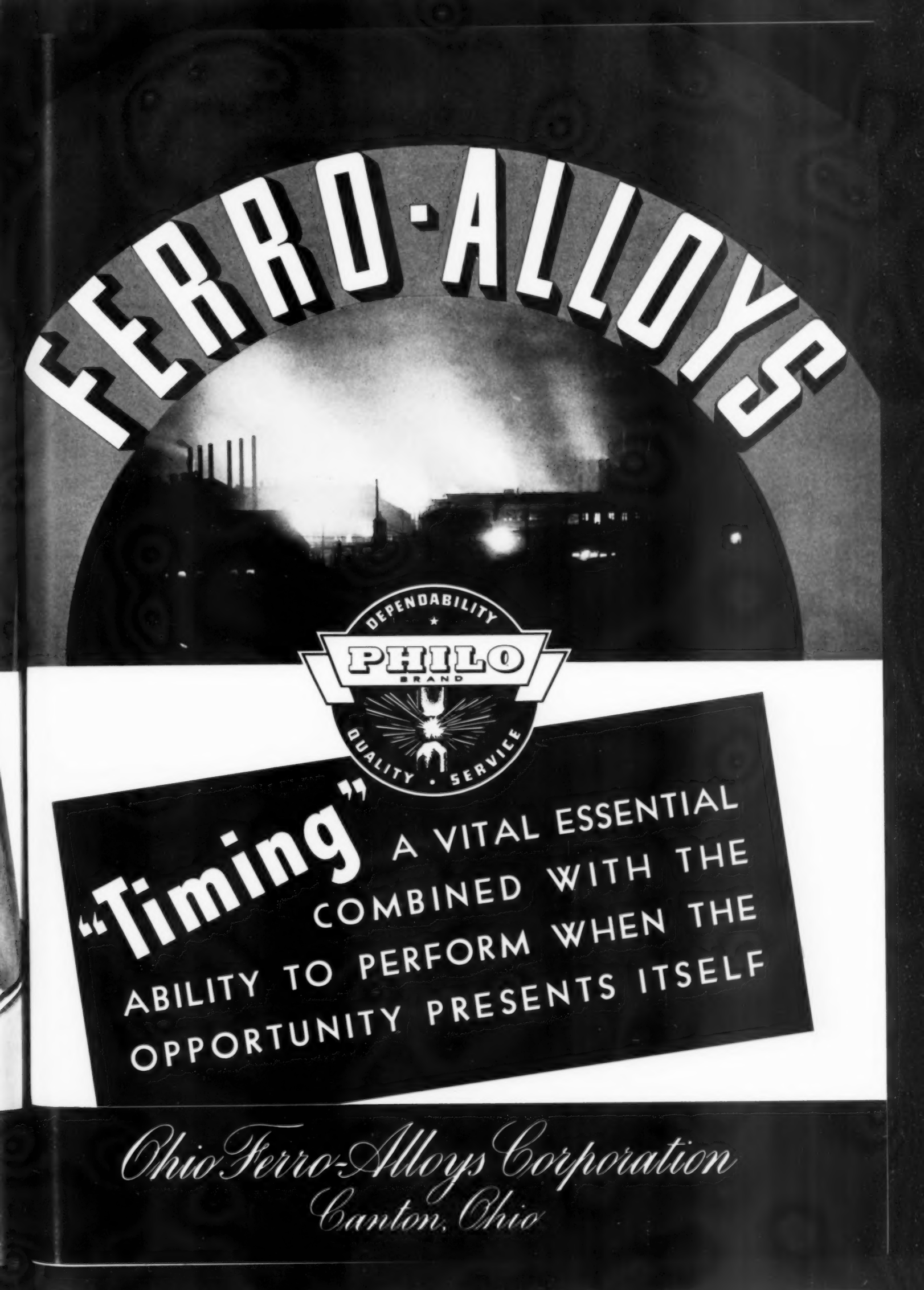
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"Timing" A VITAL ESSENTIAL
COMBINED WITH THE
ABILITY TO PERFORM WHEN THE
OPPORTUNITY PRESENTS ITSELF
Ohio Ferro-Alloys Corporation
Canton, Ohio

(*Concluded from page 62*)

of time. Then regarding the latent heat of fusion of the metal as unity the heat dissipated per unit surface area of the cylinder is

$$\frac{2\pi r_1 dr_1}{2\pi R_1}$$

which must be the same as the heat dissipated per unit area by the lower cylinder hence

$$\frac{r_1}{R_1} dr_1 = \frac{r_2}{R_2} dr_2$$

$$dr_2 = \frac{R_2 r_1}{R_1 r_2} dr_1$$

Then so long as the level of the liquid is in the upper cylinder by reasoning such as that underlying (9) if h_1 be the height of liquid in the upper, larger cylinder,

$$\phi\ (2\pi H_2 r_2 dr_2 + 2\pi h_1 r_1 dr_1) = \pi r_1^2\, dh_1$$

$$2\phi\ (H_2 r_2 \frac{R_2 r_1}{R_1 r_2} dr_1 + h_1 r_1 dr_1) = r_1^2\, dh_1$$

$$2\phi\ (H_2 \frac{R_2}{R_1} + h_1) r_1\, dr_1 = r_1^2\, dh_1$$

$$2\phi\ (H_2 \frac{R_2}{R_1} + h_1) dr_1 = r_1\, d\, h_1$$

$$2\phi\ \frac{dr_1}{r_1} = \frac{d\, h_1}{H_2 \frac{R_2}{R_1} + h_1}$$

$$2\phi\ \log_e r_1 = \log_e (H_2 \frac{R_2}{R_1} + h_1) + I$$

but

$$2\phi \log_e R_1 = \log_e\ (H_2 \frac{R_2}{R_1} + H_1) + I$$

$$\therefore I = 2\phi \log_e R_1 - \log_e\ (H_2 \frac{R_2}{R_1} + H_1)$$

and

$$2\phi \log_e r_1 = \log_e (H_2 \frac{R_2}{R_1} + h_1) + 2\phi \log_e R_1 - \log_e\ (H_2 \frac{R_2}{R_1} + H_1)$$

$$\log_e r_1^2\phi = \log_e \frac{R_1^2\phi (H_2 \frac{R_2}{R_1} + h_1)}{H_2 \frac{R_2}{R_1} + H_1}$$

$$r_1^2\phi = \frac{R_1^2\phi\ (H_2 \frac{R_2}{R_1} + h_1)}{H_2 \frac{R_2}{R_1} + H_1} \qquad (10)$$

[44]Incidentally the method of derivation does not yield correct results for negative values of h_1.

[45]The amount of metal frozen per unit area of circumferential surface when the lower portion is solid is

$$\frac{\pi R_2^2}{2\pi R_2} = \frac{R_2}{2}$$

The circumference of the upper cylinder being $2\pi R_1$ the total amount of solid metal per unit height at the time the lower cylinder is frozen is

$$2\pi R_1 \frac{R_2}{2} = \pi R_1 R_2$$

Let R'_1 be the inner radius of the solid mass at this moment, then

$$\pi (R_1^2 - R'^2_1) = \pi R_1 R_2$$

$$R_1^2 - R'^2_1 = R_1 R_2$$

$$R'^2_1 = R_1^2 - R_1 R_2$$

[46]The specific volume is the volume per unit mass.

[47]Ingersoll and Zobel, page 106, sec. 103, derive the equation

$$\theta = \frac{2}{1}\left\{ \frac{1}{2}\int_0^1 f(\lambda) d\lambda + \sum_{m=1}^{m=\infty}\left(e^{\frac{-h^2 m^2 \pi^2 t}{l^2}} \cos \frac{m\pi x}{l} \int_0^1 f(\lambda) \cos \frac{m\pi\lambda}{l} d\lambda \right)\right\}$$

for the temperature at distance, x, from the surface of a slab of indefinitely large area at time, t, after the temperature distribution is $\vartheta = f(x)$ if the diffusivity of the material is h^2. Also m is a whole number and λ a variable of integration.

They show also, page 54, Fig. 7b, that if the series involving the cosine function is carried to only two terms a very fair approach to accuracy is maintained for the condition where $f(x) = a\,x$. We can then rewrite the above equation

$$\theta = \frac{2a}{1}\left\{ \frac{1}{2}\int_0^1 \lambda\, d\lambda + e^{\frac{-h^2\pi^2 t}{l^2}} \cos \frac{\pi x}{l} \int_0^1 \lambda \cos \frac{\pi\lambda}{l} d\lambda + e^{\frac{-h^2\pi^2 t}{l^2}} \cos \frac{2\pi x}{l} \int_0^1 \lambda \cos \frac{2\pi\lambda}{l} d\lambda \right\}$$

now

$$\int \lambda\, d\lambda = \frac{\lambda^2}{2} \quad \therefore \int_0^1 \lambda\, d\lambda = \frac{1^2}{2}$$

and the second integral may be rewritten

$$\int \lambda \cos \frac{\pi\lambda}{1} d\lambda = \int \frac{1}{\pi} \cos \frac{\pi\lambda}{1} \frac{\pi\lambda}{1} d\lambda$$

$$= \int \frac{1}{\pi} \cos \frac{\pi\lambda}{1} \frac{\pi\lambda}{1} \frac{1}{\pi} d\,.\, \frac{\pi\lambda}{1}$$

$$= \frac{1^2}{\pi^2} \int \cos \frac{\pi\lambda}{1} \frac{\pi\lambda}{1} d \frac{\pi\lambda}{1}$$

which according to Pierce, *A Short Table of Integrals*, No. 340, becomes

$$\int \lambda \cos \frac{\pi\lambda}{1} d\lambda = \left(\cos \frac{\pi\lambda}{1} + \frac{\pi\lambda}{1} \sin \frac{\pi\lambda}{1} \right) \frac{1^2}{\pi^2}$$

$$\int_0^1 \lambda \cos \frac{\pi\lambda}{1} d\lambda = (\cos\pi + \pi \sin\pi - \cos 0 - 0)\, \frac{1^2}{\pi^2}$$

$$= (-1 + 0 - 1)\, \frac{1^2}{\pi^2} = -2\frac{1^2}{\pi^2}$$

Similarly

$$\int \lambda \cos \frac{2\pi\lambda}{1} d\lambda = \frac{1^2}{4\pi^2} \left(\cos \frac{2\pi\lambda}{1} + \frac{2\pi\lambda}{1} \sin \frac{2\pi\lambda}{1} \right)$$

and

$$\int_0^1 \lambda \cos \frac{2\pi\lambda}{1} d\lambda = (\cos 2\pi + 2\pi \sin 2\pi - \cos 0 - 0) \frac{1^2}{4\pi^2}$$

$$= (1 + 0 - 1 - 0)\, \frac{1^2}{4\pi^2} = 0$$

hence we may say at least approximately,

$$\theta = \frac{2a}{1}\left\{ \frac{1^2}{4} - 2\left(e^{\frac{-h^2\pi^2 t}{l^2}} \cos \frac{\pi x}{l} \right) \frac{1^2}{\pi^2} \right\}$$

$$= a\left(\frac{1}{2} - \frac{4}{\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}} \cos \frac{\pi x}{l} \right)$$

which if $x = 0$ becomes

$$\theta = a\left(\frac{1}{2} - \frac{4}{\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}} \right)$$

and if $x = 1$

$$\theta = a\left(\frac{1}{2} + \frac{4}{\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}} \right)$$

but $a = \frac{\theta_0}{1}$ where θ_0 is the temperature of the hotter side of the plate as measured above that of the colder both at zero time, hence

$$\theta = \theta_0 \left(\frac{1}{2} - \frac{4}{\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}} \right) \text{at the cold side of the plate.}$$

$$= \theta_0 \left(\frac{1}{2} + \frac{4}{\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}} \right) \text{at the hot side of the plate.}$$

These expressions become $\frac{1}{2} - \frac{4}{\pi^2}$ instead of 1 and 0 respectively when $t = 0$ due to the dropping of all but two terms of the series. The third term in each expression would be $\frac{4}{9\pi^2} e^{\frac{-h^2\pi^2 t}{l^2}}$ and would have the same sign as the second term and gives a somewhat better value.

[48]For more exact approaches to the correct value successive terms of the form $\frac{1}{25} e^{\frac{-25\, h^2\pi^2\, t}{l^2}}$, $\frac{1}{49} e^{\frac{-49 h^2\pi^2 t}{l^2}}$, $\frac{1}{81} e^{\frac{-81\, h^2\pi^2 t}{l^2}}$, etc. etc. may be added until any desired degree of precision is attained.

WHAT IS THE RIGHT TYPE OF EQUIPMENT?

Illustrating
1. Air Powered Crane
2. Portable Yard Hoist
3. Stationary Pendant Hoist
4. Movable Pendant Hoist

In superseding costly hand labor and hand equipment with power handling equipment it is of course important to select that type of power crane or hoist—

(a) Which is inexpensive both as to first cost and maintenance,
(b) Which is simple in construction,
(c) Which has less dead weight,
(d) Which is capable of the most delicate control,
(e) Which can be operated and maintained by other than skilled labor.

A simple CURTIS Bridge Crane with a Cylinder Air Hoist is the ideal power crane for light and medium capacities and has many advantages over other types of power cranes, i.e.—

1. LOW FIRST COST

An air power crane costs less to purchase and install than other types of power cranes.

2. LOW OPERATING COST

The total power cost, labor cost, depreciation and maintenance costs of a Curtis Air Power Crane are less than for other power cranes.

3. OPERATED BY ORDINARY LABOR

Curtis Air Power Cranes are so simple in principle and construction that ordinary labor can operate them, without danger of abuse. Even for maintenance, a skilled electrician or mechanic is not required.

4. ACCURACY OF CONTROL

Curtis Air Hoists spot to a hair's breadth—are smooth, speedy, efficient. There is no jump or jerk, making the Curtis Hoist especially suitable for the closing of molds, machining and assembly operations, handling of explosives, molten metal and glass. Speed boxes and cushions at either or both ends of the stroke may also be provided to insure extreme delicacy of handling and control independent of the operator. Hoisting and lowering speeds are variable according to the will of the operator and nature of the load.

5. MINIMUM DEAD WEIGHT

For a given capacity, the weight of the Curtis Air Power Crane is much less than that of other power cranes, which means that the gross load to be moved on the runway is less, and lighter runways and structurals can be utilized. The crane can also be moved along the runway with less effort.

6. IMMUNE TO ABUSE OR OVERLOADS

A Curtis Crane and Air Hoist cannot be damaged by attempting to lift a load beyond its capacity. It simply will not lift overloads.

7. NOT HARMED BY ATMOSPHERIC CONDITIONS

Exposure to weather, dampness, dust, heat, steam and acid fumes or other undesirable conditions has comparatively little or no effect on a Curtis Hoist.

8. NO COSTLY PRODUCTION INTERRUPTIONS

An air power crane requires practically no servicing for years at a time and even then only of the very simplest nature. This means that costly interruptions to production are minimized.

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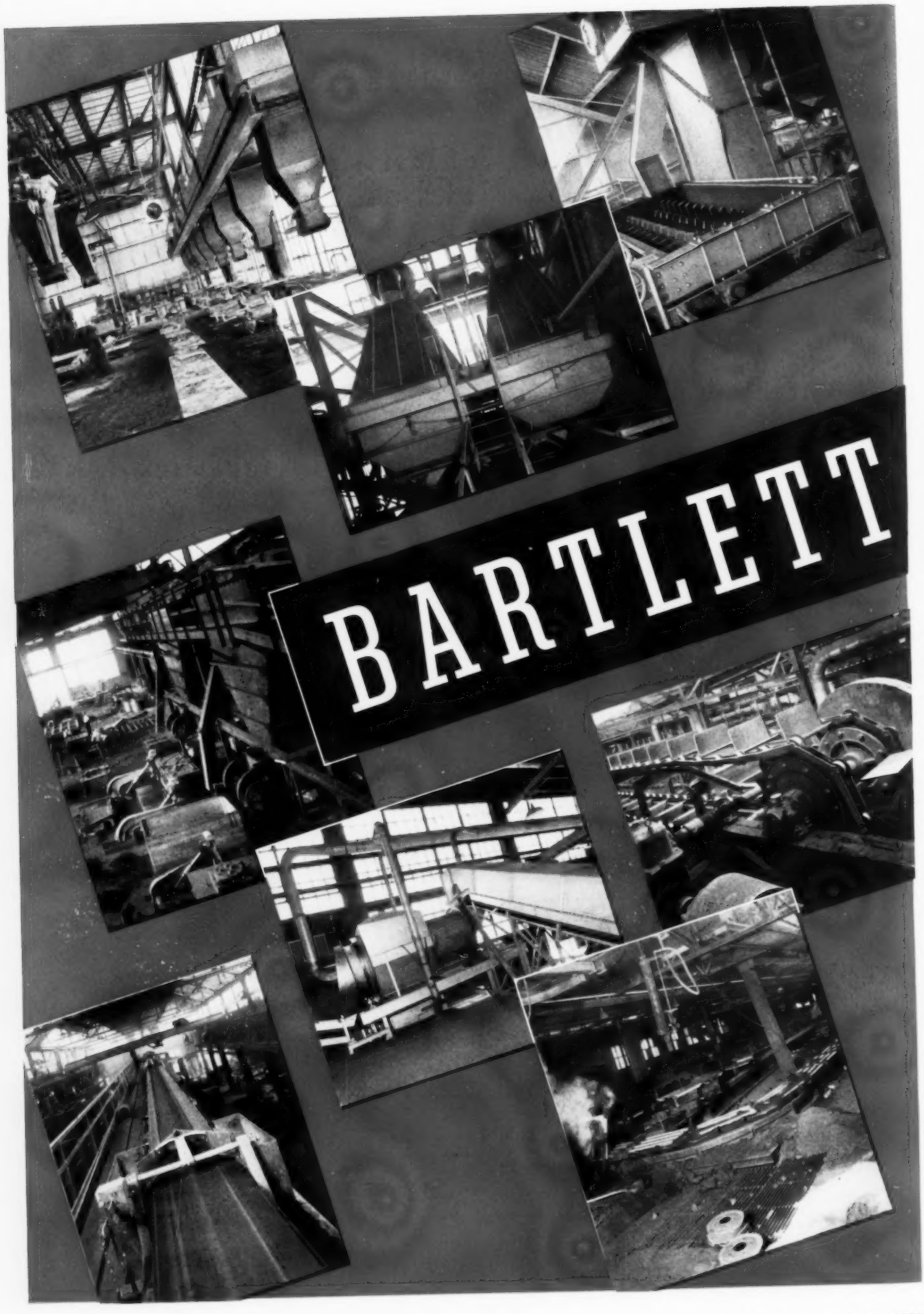
82nd Year

CURTIS COMPRESSORS — AIR HOISTS I-BEAM CRANES and TROLLEYS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• • • POINTS THE WAY TO *Greater* FOUNDRY EFFICIENCY *Lower* FOUNDRY COSTS • •

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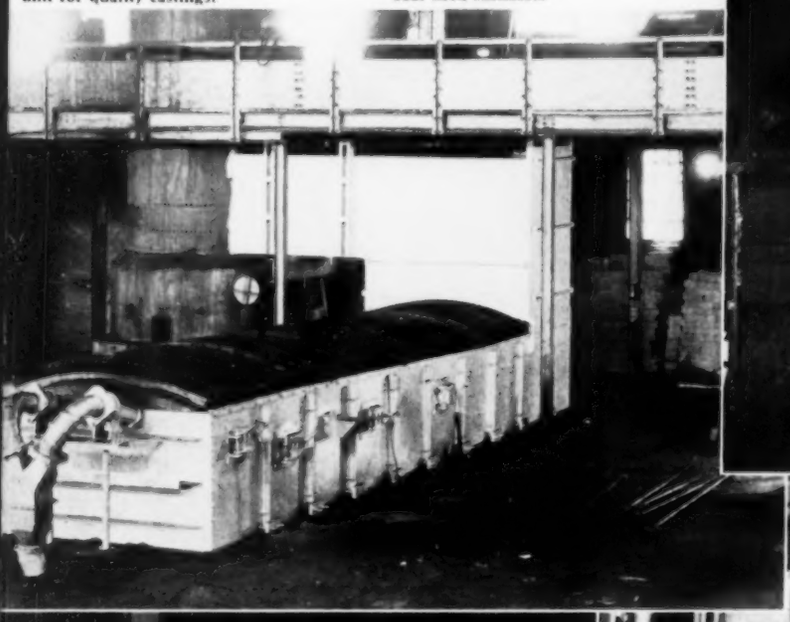
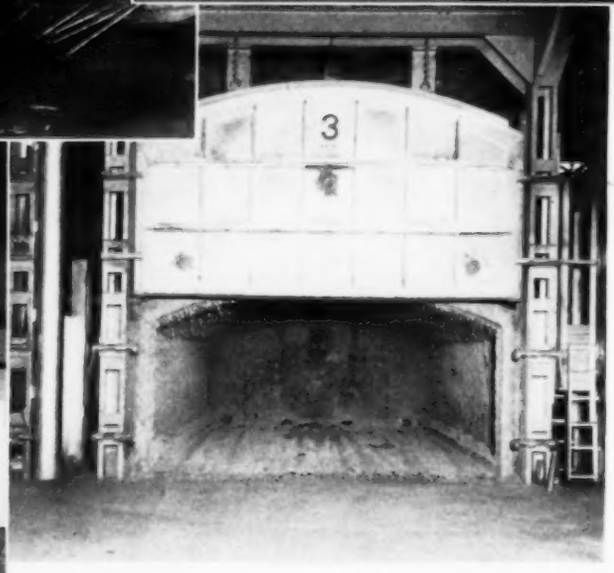
Let WHITING *Equipment h*

A Brackelsberg rotating furnace in operation in a malleable foundry. The Brackelsberg is also operating on gray iron and special alloy irons with marked success. It is the most economical melting unit for quality castings.

↑ 1



Here is a typical Whiting air furnace fired by pulverized coal. Fully 65% of the malleable iron made today is produced from pulverized-coal fired furnaces. 3 ↓



↑ 2 In this foundry they are duplexing with a Whiting cupola and a Whiting pulverized coal fired air furnace. Whiting side-blow converters and Brackelsberg rotating furnaces are also suitable for duplexing operations.

6 ↓ Besides being insulated and covered, this crane ladle has a helical-worm geared tilting mechanism, with automatic safety brake and oil pump.

↑ 5 Here you see the last word in modern annealing oven construction. Both oven and pulverizing equipment were designed and built by Whiting. The lift door is motor-operated.

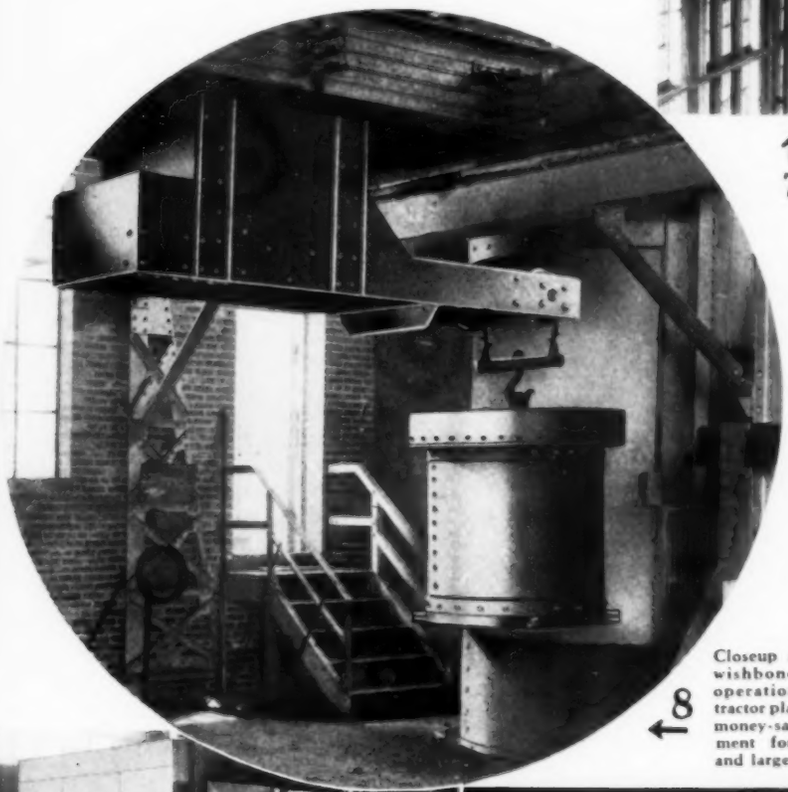
4 ← The latest idea in foundries using large quantities of seacoal is to provide their own supply with a Whiting pulverizer as shown here.

t help you to Better Profits

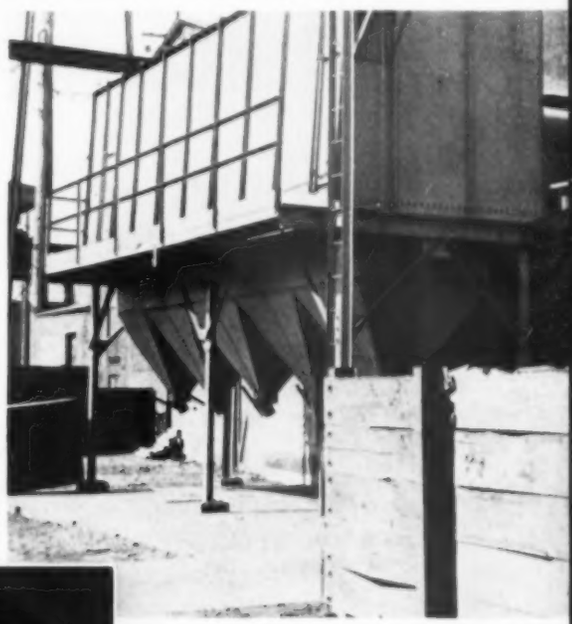
PLANT modernization is the only way out for many foundries today. We can show you numerous examples of firms who materially lowered their production costs by installing Whiting furnaces, ovens, chargers, etc.

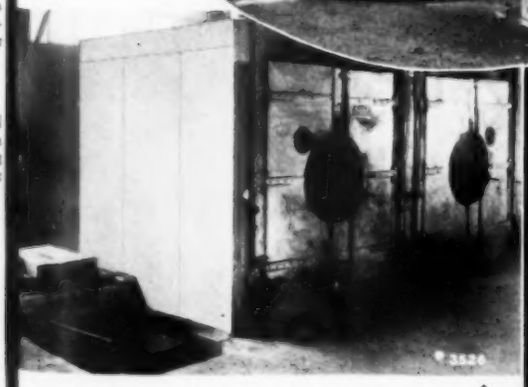
Let our engineers show you how these newest developments can help you to earn better profits. No obligation.

↑ 7 Whiting Tiger Electric Traveling Cranes are providing efficient overhead transportation to many foundries. The one shown here is equipped with special underslung trolley for charging the cupolas. It is also equipped with lifting magnet to handle pig and scrap iron.

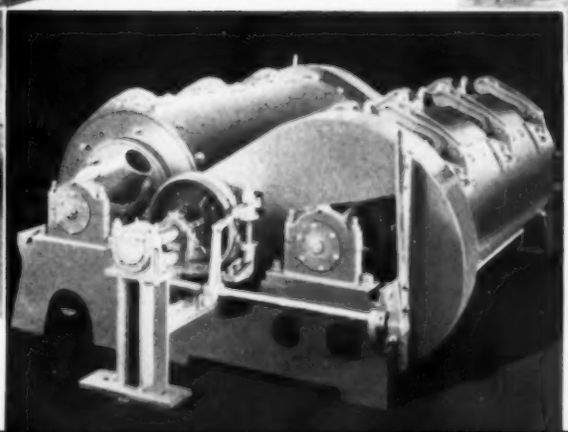


← 8 Closeup of a Whiting wishbone charger in operation in a large tractor plant. A reliable, money-saving improvement for both small and large foundries.





The Whiting Underfeed Stoker is saving time and money in the care room. Better cores at less cost. ↑ 11



↑ 10 The outstanding feature of this cloth-tube dust filter is low maintenance cost. With its individual cloth tubes, easy to clean and replace, the Whiting filter has greatly simplified the dust problem in foundries. Standard units.

← 9 Whiting roller-bearing tumbling mills are built for heavy duty and low operating costs. Round and square mills for every requirement.

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Make it a point to see the Whiting Exhibit when you come to Detroit, week of May 4th.

Our foundry friends will find a cordial welcome at Booth No. 142.

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WHITING

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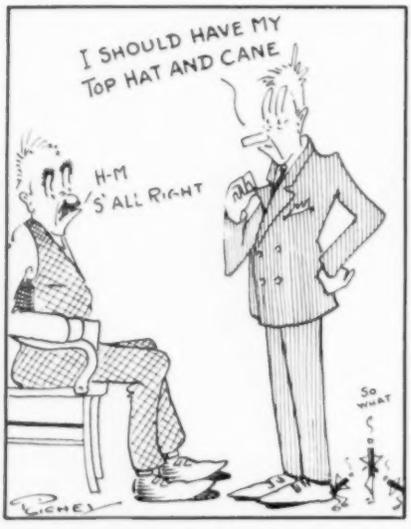


The suit seems to have its points

The Adventures of BILL

By PAT DWYER

BILL dropped in the other night to give me what he was pleased to refer to as a preview of what the well dressed man will be wearing at the coming A.F.A., convention in Detroit. He slowly pivoted to afford a good eyefull from all sides and then minced across the room daintily holding one corner of his coat between the thumb and first finger of the right hand, the while his left hand was held firmly, palm out against his left hip. One corner may seem rather indefinite, but under existing conditions I can do no better. I have been wearing coats of one kind or another for many years, but up to the present I never have heard any definite term that would apply to that particular corner — sometimes square, sometimes rounded — where the more or less verical chest line joins or merges with the skirt line. This point respectfully is referred to Amalgamated Tailors Inc. Any clever little boy or girl who has the answer to this problem may address me direct or send your reply to the station to which you are listening. Good night!

"Considering the fact," I said, "that you must have owned at least six new suits since you started buying your own clothes forty years ago—."

"What do you mean, six? Lemme tell you, young feller me lad, if all the suits I have owned were laid end to end—."

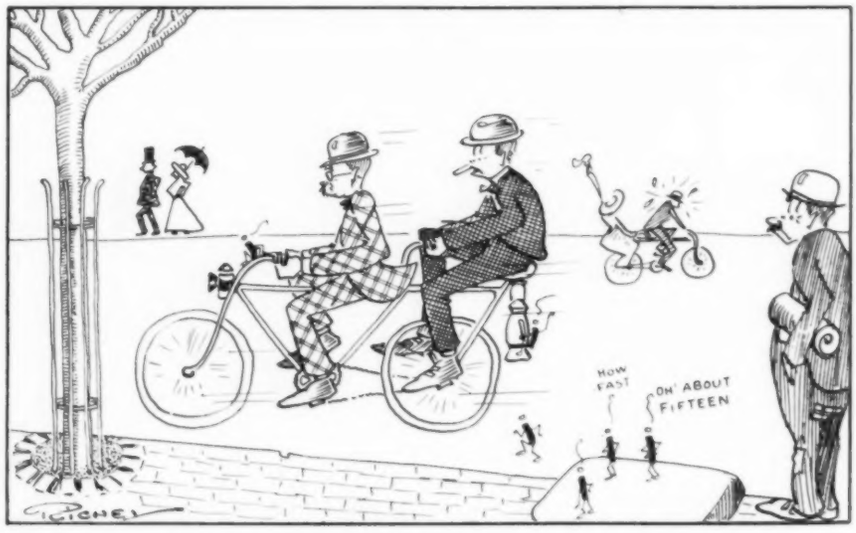
"I know. 'Twould look like one of the color charts sent out by the paint companies. However, ignoring for the moment the lamentable taste you display in insisting on bizarre colors either singly or in outrageous combination; admitting just for the sake of argument that you have owned one or two more than six suits, I still am at a loss to understand why the possession of a new suit should raise your temperature to the boiling point. 'Pon my word you remind me — with due allowance for displacement, beam and position of the Plimsoll mark — you remind me of a young girl in her first giddy party dress embellished with brilliant streamers."

"Them there is harsh words," Bill said, "and should not merit any reply since in all probability they are inspired by nothing more or less than jealousy. Yes, sir, the jealousy of an old crab who lacks the—er—ah—physical attributes to display a suit to advantage. I should have brought a cane and a top hat to give you a proper demonstration." "You don't need a cane and top hat to attract attention to that outfit. Why, dash it all man, you are as noisy now as a fire engine with siren and gong, I hope," I added pointedly, "that you will remain as far as possible away from me during the period of the convention."

"Well," said Bill, "I'll tell you. All kidding, secret pangs of envy and so forth to one side, there is something about a new suit that increases a man's self confidence to a wonderful extent. Call it vanity, egotism, pride, or just plain ignorance, but there it is and you can't get around it. Maybe it is an inheritance from the old boys who went around like so many turtles in metal shells. Certainly the lad protected fore and aft by steel plates and with an iron skillet over his head had more confidence going into battle, than the unfortunate lad with a gunny sack lashed round the waist with a hay rope and with nothing on his head but a mat of his own tangled hair.

"Conditions vary with different men in the various strata of society.

(*Continued on page* 74)



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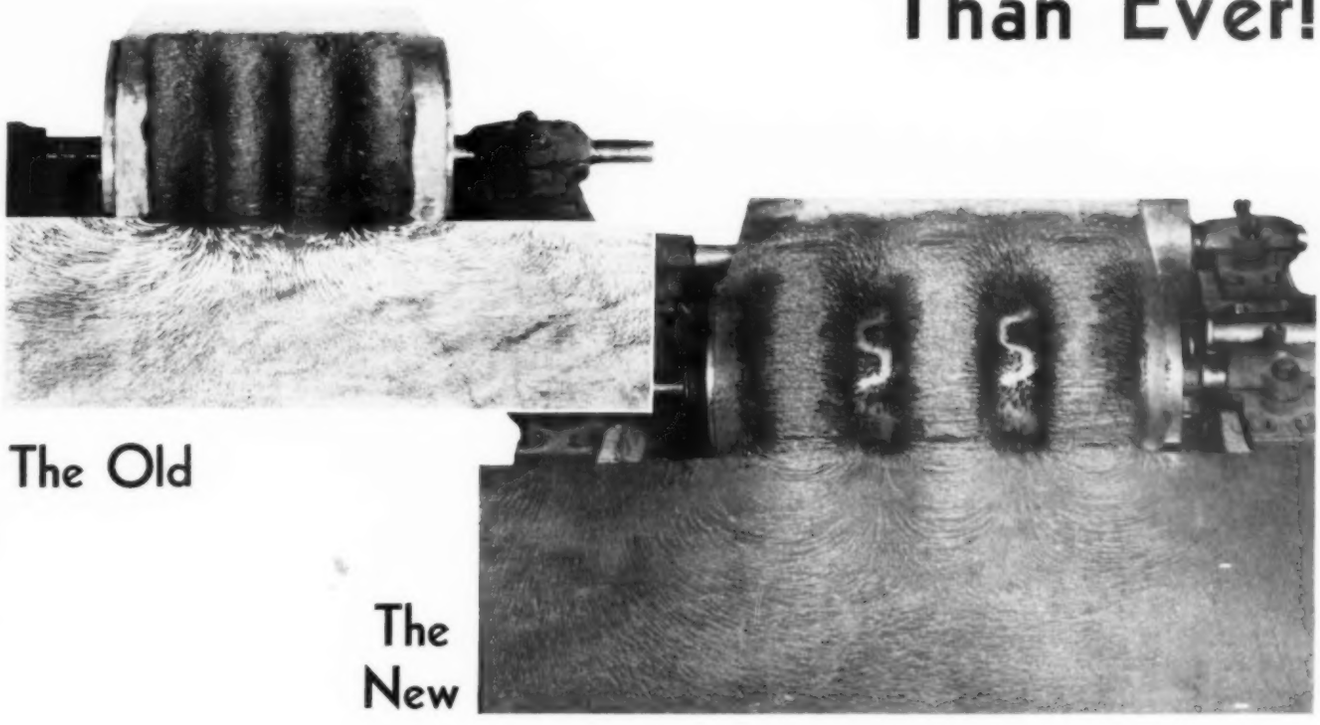
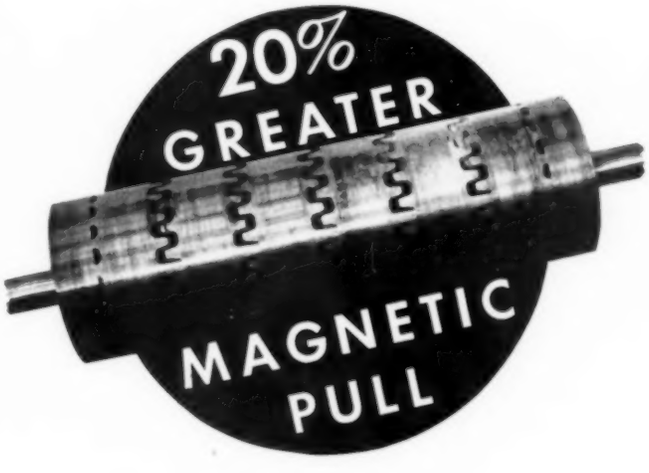


The Old

The New

Magnetic Separation at New Efficiency Peak



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THERE has never been a magnetic pulley to equal this. It represents the last word in improved design, construction, and efficiency.

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Ding's high intensity magnetic pulley features cooler operation and lower current consumption—new design with a serrated face and large ducts for longitudinal and transverse air currents assures maximum radiation. There can be no end movement, each section is key seated to the shaft. Bands are of bronze, *expensive construction* but materially improving the separating ability. General construction is of the finest, assuring long service under the hardest conditions. In short, it's the *best* magnetic separation money can buy.

We place our fully equipped laboratories at your disposal and suggest that you submit a sample of your reconditioned facing and heap sands, even though you are satisfied as to their iron-free condition. The results will amaze you. There is no obligation. Write today.

Dings Magnetic Separator Company
675 Smith Street Milwaukee, Wisconsin

Separation Headquarters Since 1899

(*Continued from page* 72)

but to the average man like you and me, I should say that the three greatest thrills of a life time never have been played up in accordance with their importance. Where is the man who forgets when he received his first pay envelope? When he received his first promotion? When he bought his first suit with his own money? Chronologically the third comes between the first and second, but as a real foretaste of celestial bliss, it is easily first. Why, down to this day the smell of a tailor shop whisks my mind back to a gorgeous checked creation for the purchase of which I had been saving money for six months. Perhaps that is one of the reasons I remember it so well."

"If your taste in clothes was as atrocious then as it is now, and I see no reason for doubting the assumption, I should not be surprised to learn that the event still figures as a mark from which time is reckoned in the old home town. At the annual open house held by the local volunteer fire department, on New Year's day, two old relics are gumming over the good old days. 'How many years, Ezry, has it been since we got the first steam pumper?' 'Well, lemme see now Uncle Amos, I just misremember the exact date, but it was the same winter young Bill what's-his-name—used to work down here in the foundry—got that suit that used to frighten all the horses. My, my, Amos, that sure was some loud suit. I mind it as well as yesterday.' Shrill cackle from Amos accompanied by vigorous wagging of the old bush."

"Seems to me," Bill stretched himself in an easy chair, crossed his long legs and ostentatiously pulled up his pants to expose a pair of poisonous green tartan socks, "seems to me that like the song that poured in torrents from every radio in the land a few months ago, we're just going round and round, Oh-o-o-o; an' comin' out heah! Just where we started. This suit of mine is the cat's whiskers for a visit to Detroit where the citizens cheer and go into a snake dance whenever any person mentions Joe Louis or the Tigers. The town has grown and changed to an amazing extent since I first saw it about 37 years ago."

"Just so, and yet you modestly disclaim all credit. All you did was to give Mayor Pingree a few tips on how to manage the city. To take it away from the Big Interests, the bloated leeches gorging themselves on its life blood, and give it back to the citizens. Then you straightened out a few initial problems for Henry Ford, set him off to a flying start and Presto! The city began to forge ahead with the well known leaps and bounds."

"The leaps and bounds stuff is O.K. In a period of less than 40 years the population of Detroit has increased from 350,000 to approximately 2,000,000. If I was grading you on the accuracy of the remainder of your cute little statements I am afraid my tender conscience would prevent me from giving you anything higher than absolute zero. My stay in Detroit was during the active touring period of my career and was limited to three or four months. With the entire country open and with jobs available everyhere I could not afford to spend more than a few months in any locality. Also in those far away and happy days, my mind was little inclined to the consideration of municipal problems, or to the problems of up and coming young inventors.

They swap a few hot ones

"I blew into Detroit one Sunday night and next morning started to make a round of the shops. In those days a molder did not have to snap thankfully at the first job that was offered. He carefully prowled through all the plants and sounded out several employes in regard to working conditions, rates of pay and the idiosyncrasies, if any, of the gaffer. He also used his eyes to shrewdly estimate whether the boys were hitting the ball at a speed above or below his capacity. With this preliminary survey filed away in the old mental index he was in position to decide where he might donate his services to the best all around interests of all concerned.

"Up to that time I never had worked in a steel foundry. I have no actual figures to offer in proof, but off hand I am inclined to the opinion that there were not more than a dozen steel foundries in the country at that time. One of these was the old Detroit Steel & Spring Co., operating two converters, and which later became the present Detroit Steel Castings Co. I had no desire to work there, but you know the old saw about a destiny which shapes our ends and all the rest of it. Out of all the foundries in Detroit I elected to work in the only steel foundry in the place. Incidentally, the experience proved of great value later, but that is another story.

"While making the rounds I ran into Archie Louden in charge of the Michigan Brass & Iron Works, better known to old timers as the *Booze Works*. Booze, as you probably remember was the vulgar name for beer at that time and—Oh, well, you probably can figure it out for yourself. A few years before as an apprentice in an eastern shop I had worked for Archie, and on the strength of this acquaintance he urged me to take the job in the steel foundry for the sake of the experience. He was a fine man and a highly competent foundryman."

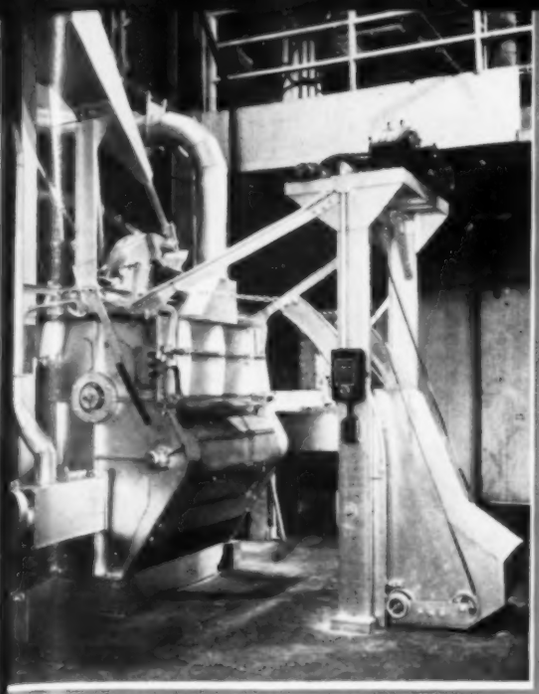
"You need not tell me," I said, "I worked for him in Ansonia when he had charge of Farrel's."

"Yeah, the same lad. He was a *lad o' pairts*, as they say in his native Glesga, and had established quite a reputation when unfortunately he was whipped off in his early forties.

"After advising me to take the steel foundry job he invited me to visit him at his home the following Sunday, share the noon day dinner and report on what progress I was making in the new field. Do you know, I shall always remember that kindly and gracious gesture extended to a young cub far from home, a stranger in a strange town.

"Archie had two hobbies, photography and bicycling. He owned a very fine tandem bicycle on which he and Mrs. Archie were accustomed to dash around in great style. If you are inclined to philosophize on the subject you will find in this incident a startling difference between conditions prevailing in ancient and modern times. At present not only the superintendent, but every man in the shop drives his own automobile and thinks nothing of it. In the day to which I refer only a few affluent individuals owned bicycles. Archie with his tandem was as far ahead of the procession, as the modern owner of a 16-cylinder streamlined limousine with a chauffeur at the wheel, is ahead of the lad in an old ratty four cylinder job held together with clothes pins, paper clips and hay wire. Stylish, my boy, no end. The absolute tops.

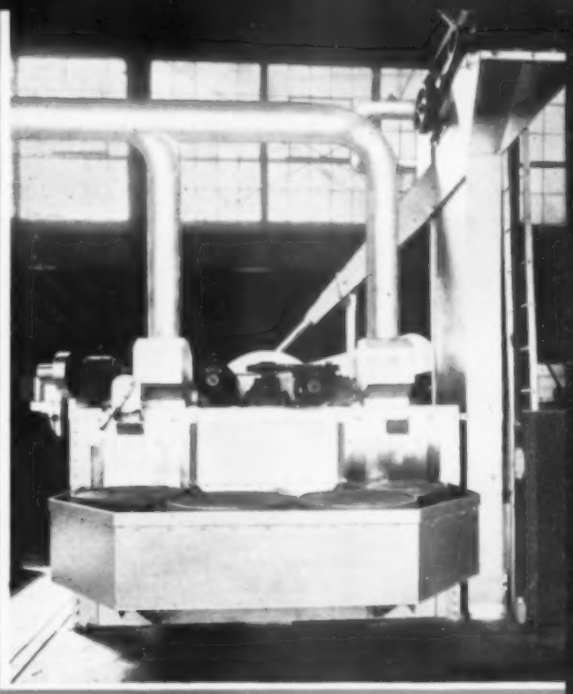
(*Concluded on page* 118)



213
WHEELABRATORS

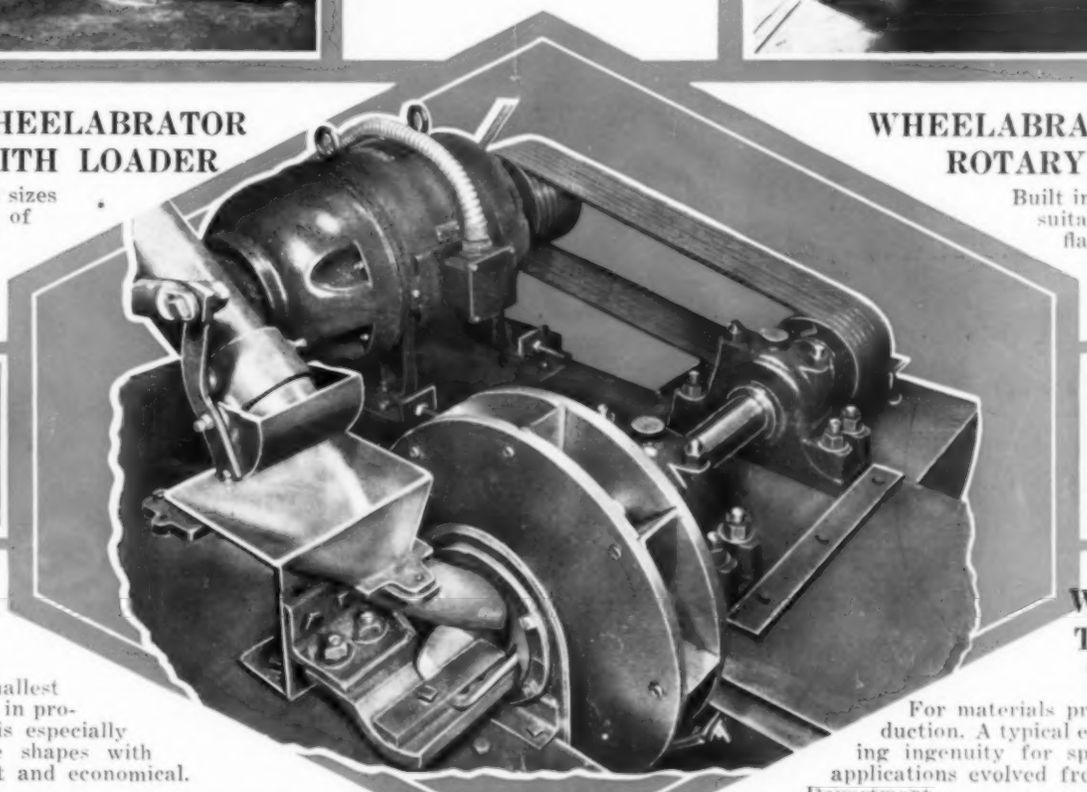
•

From the simple application of the Wheelabrator to the famous Tum-Blast Cleaning Mill, the Wheelabrator has been successfully applied to various standard types and sizes of cleaning equipment to meet almost every need, including automatic continuous production. Pressure blasting equipment is fast being replaced with modern, quick cleaning, low operating cost, Wheelabrator equipment.



MERICAN WHEELABRATOR UM-BLAST WITH LOADER

ade in three standard sizes all types and sizes of stings, to suit small large foundries.



WHEELABRATOR MULTI-ROTARY TABLE

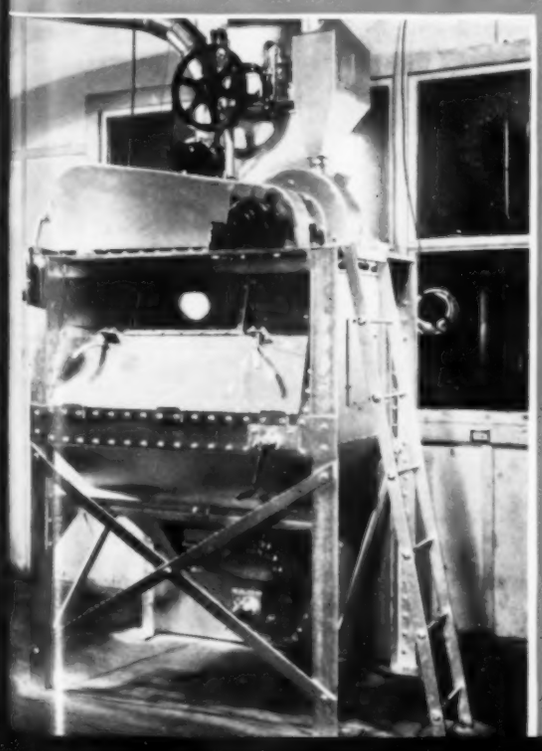
Built in two standard sizes suitable for delicate and flat work, and special sizes and shapes of castings, forgings and other products.

SMALL UTILITY CABINET

be used for the smallest s requiring cleaning in pro-tion processes. It is especially licable to intricate shapes with p recesses. Efficient and economical.

WHEELABRATOR PRODUCTION UNIT

For materials produced in line production. A typical example of engineering ingenuity for special Wheelabrator applications evolved from our Engineering Department.

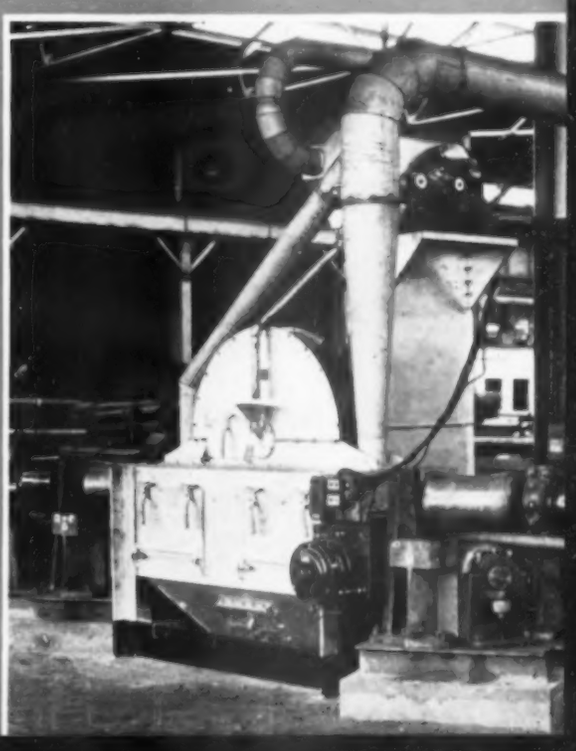


WHEELABRATORS FOR ALL REQUIREMENTS

•

Now the Wheelabrator (Airless Abrasive Cleaning) can be adapted to practically every problem. Standard equipment includes three sizes of Wheelabrator Tum-Blasts, two sizes of Wheelabrator Multi-Rotary Tables, a small cabinet and special applications for continuous production on practically every type of casting, forging, steel shape, or sheet, and many products outside the metal working industry.

Investigate today.



AMAZING SUCCESS OF THE WHEELABRATOR

213 Now Sold — None Abandoned

First commercial installation of the Wheelabrator was in connection with the American Tum - Blast and was installed at Inland Steel Company, Indiana Harbor, Indiana. It is still in constant operation.

The first general exhibit of Wheelabrator equipment was made at the American Foundrymen's Association Convention, Chicago, in June, 1933. The foundry trade was astounded at this revolutionary abrasive cleaning method. They rapidly investigated the possibilities and the Wheelabrator proved that it was not an experiment but a successful machine — and has carried out that proof by its amazing success and acceptance.

WHEELABRATOR TUM-BLAST

For years the American Tum-Blast was considered the outstanding sand blast tumbling mill available to the trade. The application of the Wheelabrator to this successful unit provides a much more efficient and economical piece of equipment. The Wheelabrator Tum-Blast is made in three standard sizes —the 27", the 36" and the 48" machines.

•

WHEELABRATOR CABINET

Small foundries and cleaning rooms having intricate products to abrade have found the American Wheelabrator Utility Cabinet an efficient and economical unit. It is shown on the other side of this page. This unit takes only a small amount of space, but cleans quickly and thoroughly.

•

WHEELABRATOR MULTI-ROTARY TABLE

Abrading of fragile pieces or parts which would be scratched or injured in tumbling can be economically cleaned in the American Wheelabrator Multi-Rotary Table which is built in two standard sizes. This machine is illustrated on the reverse page.

213 WHEELABRATORS SOLD

•

An indication of the acceptance of the Wheelabrator is portrayed in the following figures:

Wheelabrators purchased to April 1, 1936:

Malleable Foundries	34
Steel Foundries	6
Grey Iron Foundries	83
Non - Ferrous Foundries	9
Forge Shops	18
Heat Treaters	12
Steel Mills	35
Fabricators, and others	16
TOTAL WHEELABRATORS — in 3 YEARS	213
Wheelabrators shipped to foreign countries	13

•

69 REPEAT ORDERS

69 repeat orders placed by Wheelabrator users. Seldom has any industrial product met with such amazing acceptance. Such repetitive business is ample testimonial and reward for the progressive engineering of this Company in serving the foundry industry.

Not a single purchaser of Wheelabrator equipment has abandoned it.

WHEELABRATOR AUTOMATIC PRODUCTION UNIT

Success of the Wheelabrator applied to standard equipment met with such rapid approval that our engineers have spent months of research on Wheelabrating in conjunction with continuous automatic production machinery, such as in automobile plants, steel mills, metal fabricating shops, and other types of work. Many such units are in service.

•

COMPLETE WHEELABRATOR LINE

See it at the Show.

A comparison of our exhibit in 1933 with our vast exhibit at the Foundry Show, May 4th-9th, Detroit, we believe, is an outstanding example of American industrial growth. From a small display of one machine in 1933 you will find a complete and comprehensive exhibit of all types of Wheelabrator equipment in one of the largest exhibits at the Show. Don't fail to see these various machines operate, at the Show, cleaning all types of castings.

LET US PROVE WHAT THE WHEELABRATOR WILL DO FOR YOU

Please give us the opportunity of proving what the Wheelabrator will do for you. There is no obligation. Drop us a line or see us at the Show and we will make arrangements to have your castings or other products cleaned and prepared and will give you accurate costs on Wheelabrating.

Hundreds of others have found that they cannot do without the Wheelabrator - investigate today - it will pay!

SEE THE WHEELABRATOR OPERATE AT FOUNDRY SHOW — DETROIT

The AMERICAN FOUNDRY EQUIPMENT COMPANY

505 Byrkit St., Mishawaka, Indiana

Meet at University of Washington

Western foundrymen hear interesting program at annual foundry conference held in Seattle

APPRECIATION of the foundry conference and exhibit presented by the shop division of the Mechanical Engineering department, University of Washington, Seattle, March 5 was shown by the large attendance of foundry men, not only from the immediate vicinity and other towns and cities in Washington, but also from points as far distant as Los Angeles on the south and Vancouver, B. C., on the north.

The program was arranged, staged and supervised by Gilbert S. Schaller, associate professor, mechanical engineering, University of Washington, with C. L. Sullivan, instructor, in charge of the exhibit on the main floor of the engineering shops building. A well equipped foundry occupies approximately one half the floor space in this building, while an extensive group of machine tools on which the students practice the various machining and tooling operations is located on the other half of the floor space. Equipment for demonstrating various types of welding occupies part of the foundry floor space. Sand testing apparatus made by H. W. Dietert, Detroit, also is located in a room in this section of the building.

Exhibit Is Varied

The list of exhibitors follows: Anti-Corrosive Metal Products Co., Albany, N. Y.; Bethlehem Steel Co., Bethlehem, Pa.; Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; Caterpillar Tractor Co., Peoria, Ill.; R. E. Chase & Co., Seattle and Tacoma, Wash.; Climax Molybdenum Co., Los Angeles; Columbia Steel Co., San Francisco; Cragin & Co., Seattle; Cumberland Coal Co., Seattle; De Luxe Products Co., LaPorte, Ind.; Doran Co., Seattle; Duriron Co., Dayton, O.; Eaton-Erb Foundry Co., Detroit; Electric Steel Foundry Co., Portland, Ore.; Electro Metallurgical Corp., San Francisco; Ford Motor Co., Detroit; International Nickel Co., New York; Michigan Steel Casting Co., Detroit; C. F. Miller & Co., Seattle; Nash Motors Co., Kenosha, Wis.; National Engineering Co., Chicago; New Jersey Zinc Co., New York; Olympic Foundry Co., Seattle; Pacific Car & Foundry Co., Seattle; Pacific Graphite Works, Oakland, Calif.; Thompson Products Inc., Cleveland; Titanium Alloy Mfg. Co., Niagara Falls, N. Y.; Vanadium Corp. of America, Bridgeville, Pa.; Vulcan Foundry, Oakland, Calif.; Washington Iron Works, Seattle; Western Foundry Sand Co., Seattle; and West Coast Meehanite Metal Corp., Los Angeles.

Hold Evening Session

Technical sessions, afternoon and evening were held in Guggenheim hall, and included presentation of papers on nickel alloyed cast iron, gates and risers for castings, physical testing of metals and later developments in the foundry industry.

At the dinner preceding the evening session, attended by approximately 250 foundrymen, at which Gilbert S. Schaller presided as toast master, brief addresses were delivered by Dr. Lee Paul Sieg, president of the university and by E. A. Loew, dean of the college of engineering. Dr. Sieg extended the official welcome and the assurance that the university is in full sympathy with any movement designed to disseminate further technical and scientific knowledge among foundrymen. E. A. Loew, dean of the college of engineering presented a resume of the development of the mechanical arts, the manner in which civilization has been affected by this development and the important part played by metals in their various applications.

E. O. Eastwood, professor of mechanical engineering presided over the afternoon session at which addresses were delivered by A. G. Zima, research and development engineer, International Nickel Co., Los Angeles, and by Pat Dwyer, engineering editor THE FOUNDRY, Cleveland. In discussing nickel alloyed cast iron and steel castings Mr. Zima pointed out that to realize the full value of the alloy additions a properly calculated base mixture is essential. Also good foundry practice is necessary. Addition of alloys is not a cureall for every form of foundry trouble. With the aid of micrographs and charts he illustrated how physical properties of many types of castings were improved by alloy additions.

Mr. Dwyer outlined some of the applications and functions of gates and risers in their relation to the production of clean, solid castings. He claimed that the subject presented so many ramifications he could not do justice to it in a brief presentation. For a complete coverage of the subject in its multiplicity of detail he referred his audience to his recent book *Gates and Risers for Castings*, published by the Penton Publishing Co., Cleveland.

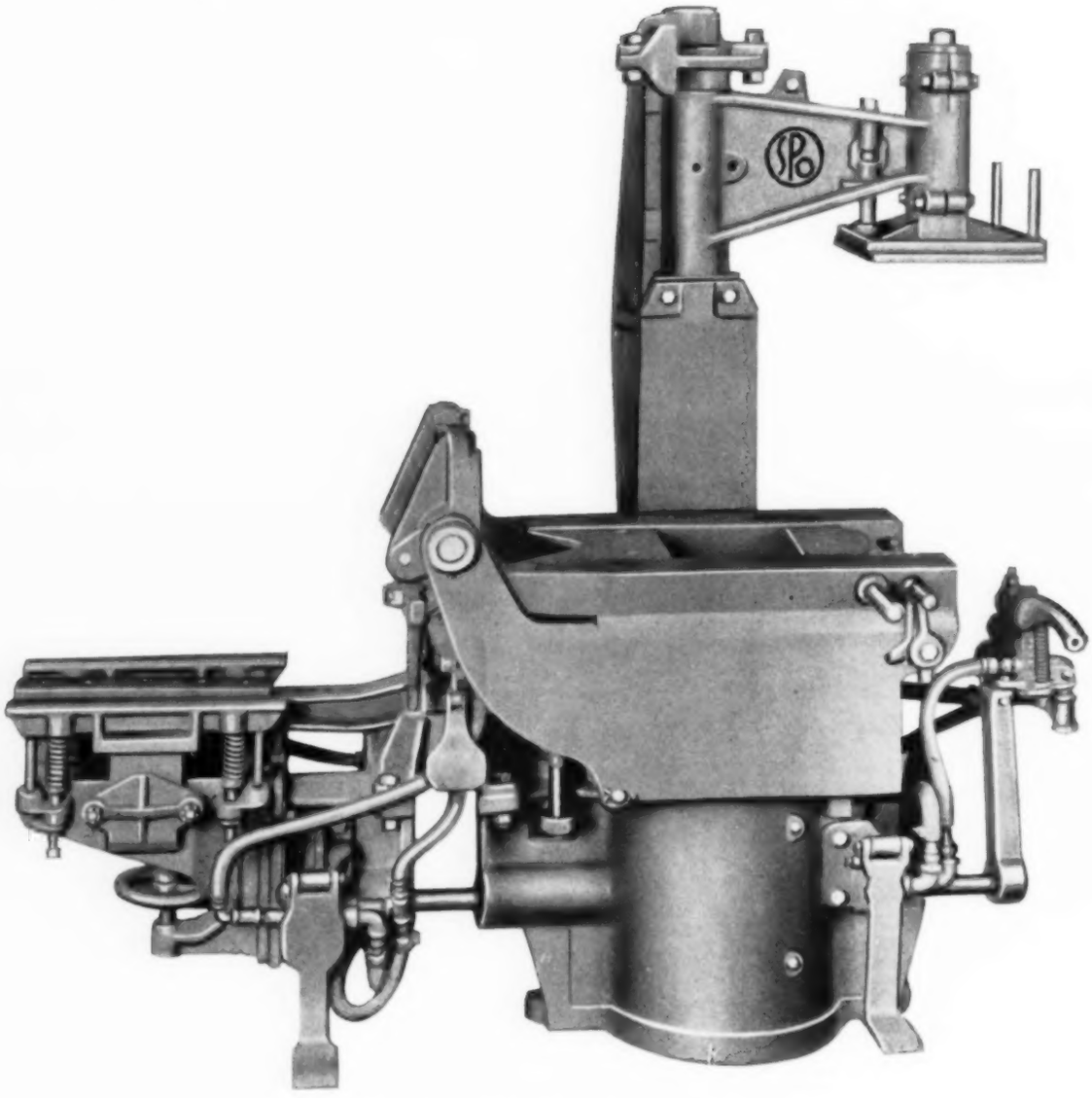
At the evening session presided over by Frank W. McKenzie, Webster-Brinley Co., Seattle, B. T. McMinn, associate professor, mechanical engineering, University of Washington presented a paper on the physical testing of metals. Pat Dwyer delivered an interesting address tracing the development of the foundry industry from its incipient stages to the magnitude it has attained in recent years. He concluded by an enumeration of the latest developments and the equipment, materials and processes now in use.

Attend Regular Meeting

In anticipation of the conference and exhibition March 5, the regular bimonthly meeting of the Pacific Northwest Chapter of the Gray Iron Founders' society was postponed from the regular date and held on the evening of March 4 at the Frye hotel, Seattle. In addition to the regular members, a large number of out of town foundrymen were present on this occasion at the dinner, entertainment and meeting presided over by R. E. Kucher, Olympic Foundry Co., Seattle. Edwin C. Gustin, Western Foundry Sand Co., is secretary of the chapter.

SYMBOLIC SPO OF BETTER MOLDING MACHINES

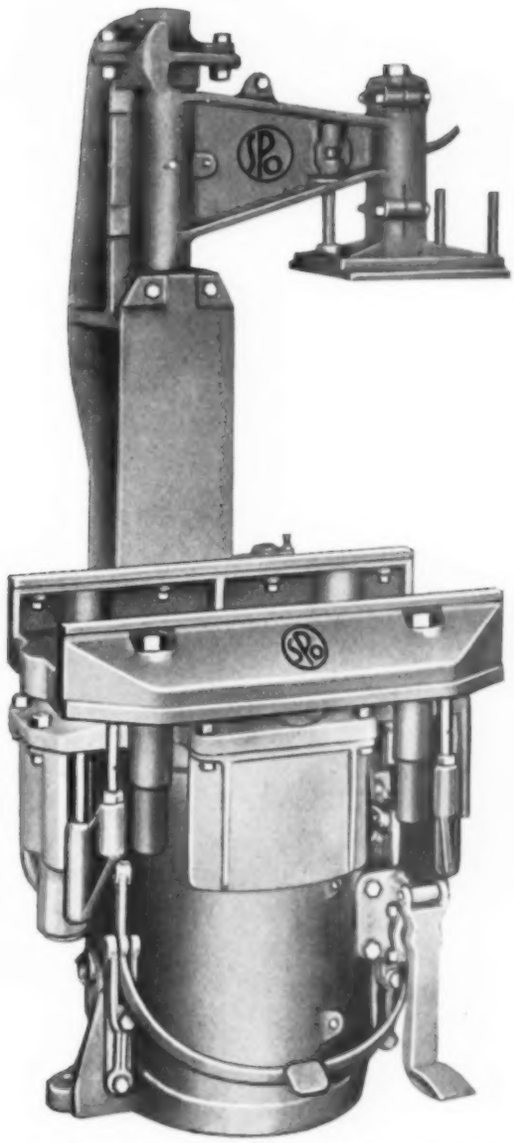
See these MOLDING at the Foundry



SPO NO. 413 JOLT SQUEEZE ROCKOVER
PATTERN DRAW MOLDING MACHINE.

new MACHINES Operating Convention!

JOLT SQUEEZE STRIPPER MOLDING MACHINES FOR HIGH PRODUCTION



SPO NO. 214 JOLT SQUEEZE STRIPPER
Made in Squeeze Piston Sizes — 13", 14", 16", 18", 21"

SPO Incorporated

Manufacturers of a Complete Line of Molding Machines and Vibrators

EAST 61st ST. AND WATERMAN AVE., CLEVELAND, OHIO

YOUR EQUIPMENT DOLLARS GO FURTHER AND COME BACK QUICKER WITH SPO MOLDING MACHINES

Detroit Chapter Prepares A.F.A. Welcome

(*Concluded from page 37*)

the Ford symphony radio hour on Sunday evenings, and his address at the banquet should prove exceptionally interesting to all convention visitors. The subject of the address will be announced later. A reception and dance will be held at the Book-Cadillac following the dinner.

The golf committee, with W. B. Crawford, Atlas Foundry Co. as chairman, is making arrangements for convention visitors who desire, to play on a number of the fine courses in and around the city. Information on courses available may be secured at the registration booth at Convention hall.

The technical features of the convention, comprising a well balanced program of papers, committee reports and informal discussions, offer an exceedingly instructive cross section of progress in all branches of the foundry industry. Highlights of the program include practical shop operation courses on sand and gray cast iron; round table discussions; technical sessions covering cast iron, steel, malleable and nonferrous practice, sand control, foundry refractories; and the work of the cost committee. Meetings on apprentice training and progress in medical, legislative and engineering aspects of safety and hygiene in the foundry will present discussions of vital importance to the foundry industry today.

The association has been granted a special round trip rate of one and one-third the one way fare for all members and members' families attending the convention. This fare is based on the present mileage rate and is under the identification certification plan. The identification certificates will be mailed to individual members from association headquarters, and additional certificates may be obtained by members from that office. The tickets at the special rate will be on sale from April 30 to May 7 in most districts, except the Far West and Southwest where they may be obtained earlier. Full particulars may be obtained from any local ticket agent.

Foundry Plays Host

Lebanon Steel Foundry Co., Lebanon, Pa., was visited recently by a group of forty officers and employes of Lebanon county banks, as a part of the educational program of the American Institute of Banking. The management of the company provided guides for the party and an interesting tour of inspection was made through the plant. The public relations group of the institute is planning other industrial tours for the purpose of acquainting the banking class with a practical knowledge of industrial operations.

Discusses Uses Of Alloy Steel Castings

A. C. Jones, research engineer, Lebanon Steel Foundry, Lebanon, Pa., presented an address on "Alloy Castings," at the meeting of the Metropolitan Philadelphia Chapter of the American Foundrymen's association, held March 13 at the Engineer's club.

Mr. Jones covered the general field of alloy castings in a comprehensive way, including in his discussion salient features pertaining to alloys for structural wear, corrosion, and heat resisting applications. He illustrated his talk with a number of lantern slides.

Following dinner, Norman M. Wood Sr., a member of the board of commissioners at Harrisburg, Pa., showed interesting moving pictures of game life in Pennsylvania.

Speaks on Castings From Buyer's Viewpoint

Approximately 100 members and guests of the Pittsburgh Foundrymen's association met at the Fort Pitt hotel, March 16. An additional number attended the after-dinner session, which was addressed by Norman L. Mochel, metallurgist of the Westinghouse Electric & Mfg. Co., Eddystone, Pa., who presented an interesting talk on "Castings From a Consumer's Point of View." Walter H. White, Pittsburgh Rolls Corp., conducted the discussion.

It was voted to offer a resolution to the memory of E. D. Frohman, who died in India while enroute on a world cruise in February of 1936. Mr. Frohman was one of the oldest members of the Pittsburgh Foundrymen's association, having dated his membership from 1902. T. A. Reynolds, McConway & Torley Corp., H. P. Spilker, Sterrit-Thomas Foundry Co., and Frank J. Buerger, J. S. McCormick, Pittsburgh, were chosen as the committee of three to present a suitable resolution.

Ferdinand Schultz, Mt. Lebanon, Pittsburgh, received the door prize at the March meeting.

Foote Bros. Gear & Machine Corp., Chicago, has taken over all activities and assets of the Foote Bros. Gear & Machine Co., 5301 Southwestern boulevard, Chicago. Consolidated equipment has been moved to the Plamondon plant.

Foundry Practice Is Feature At Boston

W. J. Matson, Farrel Foundry & Machine Co., Waterbury, Conn., was the principal speaker at the March 11 meeting of the New England Foundrymen's association, held at the Engineer's club, Boston. After presentation by A. S. Wright, president of the association, Mr. Matson introduced his talk by a discussion of cupola operation, pointing out the necessity for variation in practice, depending on individual cupolas and foundries. He spoke on the advantages of a forehearth, explaining that it had been of value to his company in two ways—the carbon was kept low and the filling of large ladles from five to 10-ton capacity at once was made possible. The forehearth also serves as a mixer for the molten metal.

He spoke briefly of the rotary powdered coal fired furnace, the importance of the temperature of iron, and the company's firm belief in the use of the optical pyrometer for control work. The speaker also discussed gating, apprenticeship, and the progress made in iron production since 1890, with quotations of analyses of materials made from that period to the present time. Steel in the mixture was used as early as 1900. Attention was called to the fact that a cost system is necessary to produce a fair profit and better business.

P. Kyle, Massachusetts Institute of Technology, outlined the present foundry training given to engineering students at the institute, explaining that the course had been altered to include less molding practice and give more attention to design.

Book Review

Metallography and Heat Treatment of Iron and Steel, by Albert Sauveur, fourth edition; cloth, 550 pages; published by McGraw-Hill Book Co. Inc., New York; supplied by THE FOUNDRY, Cleveland, for $8, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd. London.

A fourth edition of this work, the first edition appearing in 1916, brings each chapter up to date, contains much new information and covers latest developments.

Two new chapters have been added, one on metallic crystals and their atomic structures, dealing with the fundamentals of the X-ray diffraction analysis of metals. Another deals with the author's view in regard to the hardening of steel and the constituents of iron-carbon alloys. An important chapter has to do with the occurrence, causes and effects of thermal critical points.

AJAX

STARS IN THEIR RESPECTIVE ORBITS

The Ajax Metal Co., Philadelphia
Quality Ingots

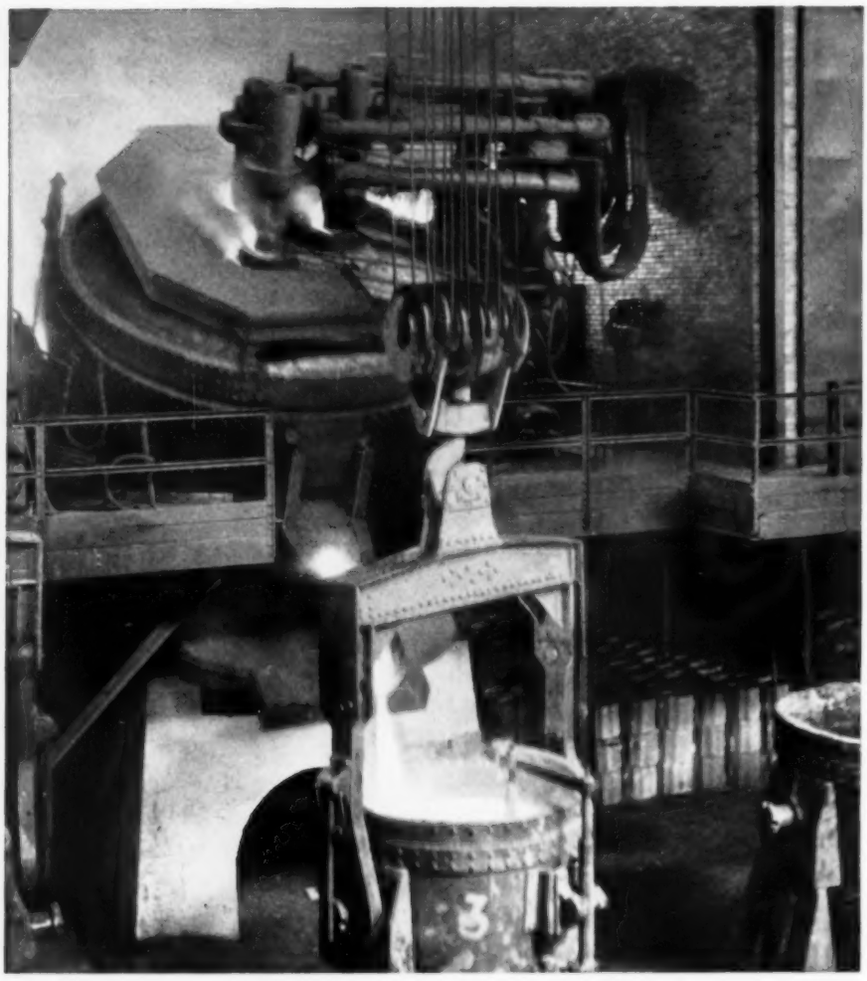
Ajax Electrothermic Corp., Trenton
Ajax-Northrup Furnaces

Ajax Electric Furnace Corp., Philadelphia
Ajax-Wyatt Furnaces

INVITE YOU ★

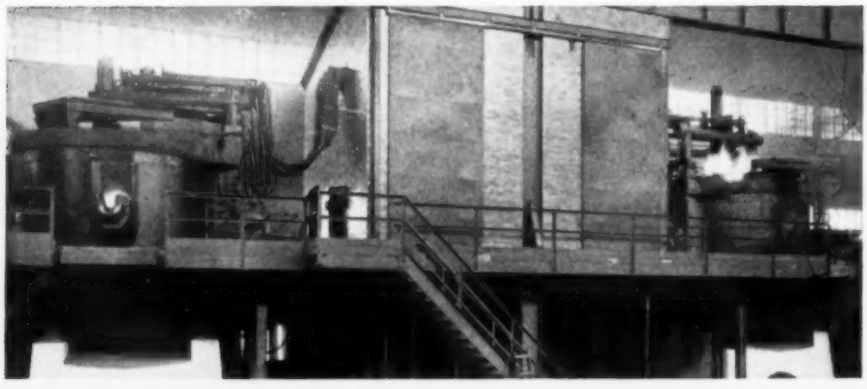
AFA CONVENTION VISITORS TO USE OUR SPACE [NO. 43] IN WHICH TO MEET YOUR FRIENDS IN THE EXHIBITION HALL

Want *half a ton*?
...or 100 *Tons*?



(Above) ***Pouring one of this pair of Type 25 Heroult Electric Furnaces.***

(Below) ***A double installation of Type 25 Heroult Electric Furnaces.***



USE HEROULT ELECTRIC FURNACES

WHEN you melt or refine any kind of ferrous metal—alloy and tool steels, iron and steel castings—by either basic or acid process, you will get efficient operation and excellent metallurgical performance with a Heroult Electric Furnace.

Consider these points—

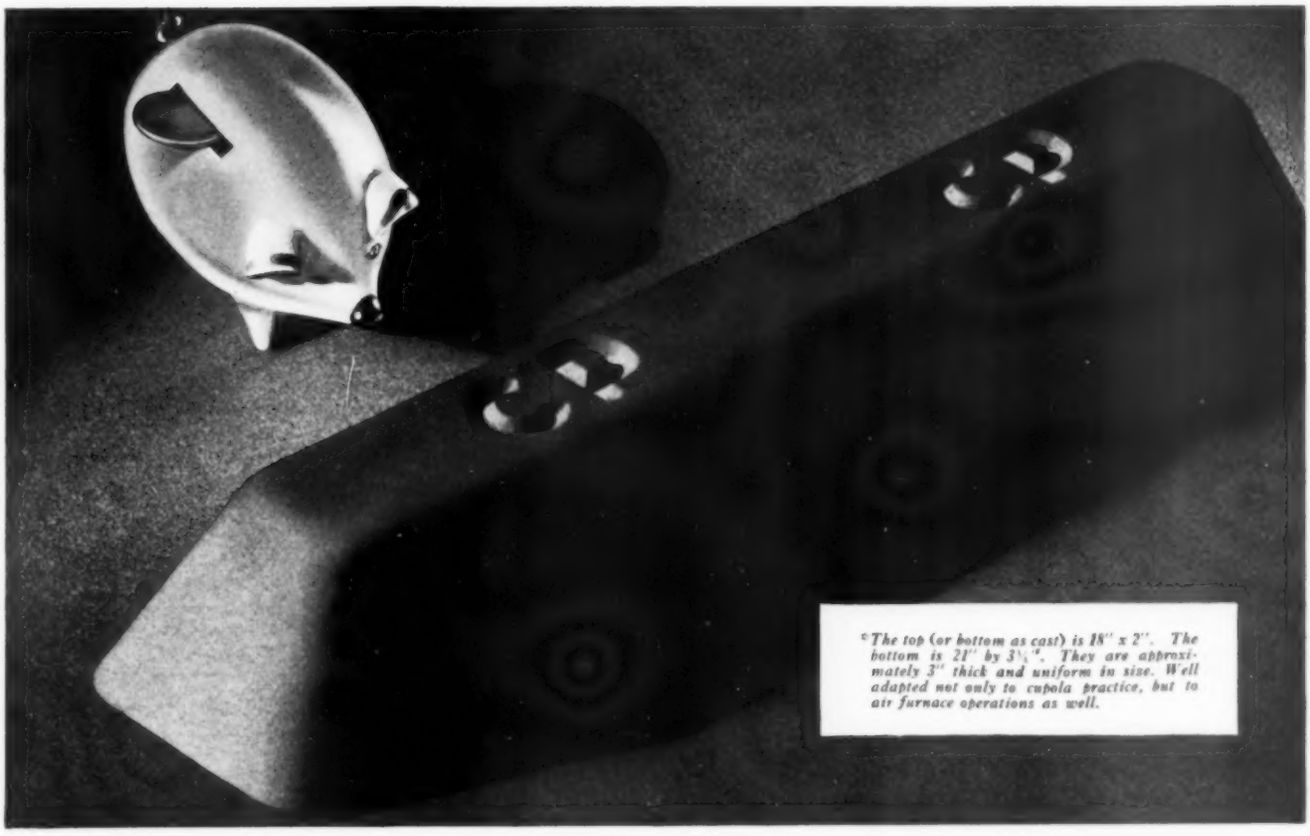
1—Extremely sturdy design lowers upkeep costs.
2—Strong and simple tilting mechanism (assures safety in operation).
3—Friction losses and inertia are reduced to a minimum to give sensitivity of control.
4—Charge quickly by hand, chute, bottom-drop bucket, or machine—depending on size and operating conditions.
5—Melt quickly because of high-powered flexible transformer equipment.
6—Operating costs are low because of careful attention to details of mechanical, electrical and refractory design.

American Bridge Company can design and construct a Heroult Electric Furnace to meet your special needs.

AMERICAN BRIDGE COMPANY
General Offices: Pittsburgh
BALTIMORE · BOSTON · CHICAGO
CINCINNATI · CLEVELAND · DENVER
DETROIT · DULUTH · MINNEAPOLIS
NEW YORK · PHILADELPHIA · ST. LOUIS
Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

THESE "*little Pigs*" WILL SAVE YOU MONEY!



**The top (or bottom as cast) is 18" x 2". The bottom is 21" by 3½". They are approximately 3" thick and uniform in size. Well adapted not only to cupola practice, but to air furnace operations as well.*

Announcing CARILLCO PIGLETS

SMALL, weighing only about 40 lbs., Carillco Piglets are designed to save money by increasing speed in handling, charging, and melting. They make better, more uniform castings possible at lower cost. They decrease foundry losses . . . reduce labor cost . . . shorten melting time . . . save fuel.

Carillco Piglets, in short, are better pig iron in an improved, common-sense form*. Their size, shape and the processes used in their manufacture give them a more refined grain structure and also tend to control the carbon in solution, thus preventing the formation of kish.

The small size of Carillco Piglets makes it possible to distribute the iron in the cupola charge more easily and uniformly. Their uniformity in size tends to produce greater uniformity in melting. Their trapezoid shaped cross-section exposes more surface per pound of metal, and also permits heat to reach the interior of the pig evenly from all directions. These features combine to make absorption of heat more rapid and uniform, so that Carillco Piglets will melt quicker and with less fuel.

Investigate Carillco Piglets. Initials "CP" cast intaglio on the top quickly identify them.

CARNEGIE-ILLINOIS STEEL CORPORATION · *Pittsburgh, Pa.*

Southern Pig Iron in standard form, produced by Tennessee Coal, Iron & Railroad Company, is also available for shipment throughout the North and South.

See our Exhibit

FOUNDRY SHOW

DETROIT

MAY 4TH TO 9TH

SPACE 331 - 3 - 5

UNITED STATES STEEL

"LAST CALL" *for the* BIGGEST FOUNDRY SHOW *in Years*

● The largest, most important Convention and Exposition of the Foundry Industry since 1930 . . . a Foundry Show that has *everything!* Splendid technical program—scores of operating exhibits—plant visitations—new program features—worth-while entertainment—diverting surprises . . all in a centralized convention city and a convention hall unusually accessible to downtown district. Hundreds of industrial leaders in attendance, willing to discuss your special problems of metallurgy, materials handling, production, plant control. Startling developments in machinery, equipment and supplies for foundry use, for you to examine and compare in one place at one time. Come and learn what your industry is doing . . . *participate and profit.* You can't afford to miss this rare opportunity to obtain new facts, new ideas, new inspiration and new enthusiasm for the industry you represent.

You have to Know to keep Ahead!

40th Annual Convention

Foundry and Allied Industries Exposition

Convention Hall • DETROIT • May 4 to 9

American Foundrymen's Association

222 WEST ADAMS STREET • CHICAGO, ILLINOIS

Melts Metal in Rotary Furnaces

(*Continued from page* 48)

before discharging it on to a long cooling belt set on an incline and leading to two storage hoppers. The conveyors and nearly all the sand handling equipment were installed by the Jeffrey Mfg. Co., Columbus, O. Capacity of the installation is approximately 60 tons of sand per hour whether the foundry is operated on single, double or triple shift.

Preparing the Sand

The storage tanks mark the outer limit of the sand movement. At this point the direction of travel is reversed and the sand begins to move toward the molding station. Measured amounts of sand are treated in a pair of muller type mixers made by the National Engineering Co., Chicago. At this stage any necessary adjustment is made to the sand mixture as indicated by tests carried on during the day. Batches of prepared sand are discharged into hoppers under the mixing pans. By opening the gates on these hoppers alternately a constant stream of sand is fed to a belt which carries it to an aerator and thence to a belt which discharges into hoppers over the sandslingers and molding machines. This completes the circuit. Sand carried over the hoppers is discharged into a chute leading to the main belt under the floor which also catches the sand spilled around the machines. This sand falls through the grated floor to a platform from which it is scraped by a revolving arm and delivered to the belt which passes under the shakeout station.

Metal is melted in a battery of four rotary powdered coal fired furnaces made by the Whiting Corp., Harvey, Ill., and in one electric furnace supplied by the Pittsburgh Electric Furnace Corp., Pittsburgh. The 10-ton electric furnace is equipped with a movable roof to permit cold charging if necessary.

The Brackelsberg furnaces have individual maximum melting capacity of 8 tons. For pouring the gray iron castings, half the charge is tapped into a 4-ton reservoir ladle. After this amount has been distributed from a number of 1000-pound capacity ladles suspended from a monorail, the second half of the heat is tapped and distributed in the same manner. Two tap holes are provided in the cone nose of the furnace. Instead of tilting the furnace from a horizontal position, the furnace is rotated to bring the tap hole at the lowest point in the circle. The reservoir ladle mounted on a carriage running on a short length of track is moved under the tap hole and filled with metal. It is then moved in the opposite direction a short distance where it is in position for transferring the metal to the small pouring ladles. The entire heat of steel is tapped at one time, whether from the powdered coal fired furnace to the electric furnace, or from the electric furnace to the reservoir ladle.

The furnaces are charged mechanically. Steel boxes with one side open are filled in the yard and moved on a track into the furnace bay where they are lifted by either one of two 15-ton cranes to a narrow balcony. Through a vertical screw tilting mechanism the furnace is tilted to an angle of approximately 45 degrees from the horizontal. In this position the slag automatically is drained through the lower opening into a small ladle mounted on a buggy. After the slag is removed a stopper is inserted in the opening to prevent any of the incoming charge from falling through. At this stage the upper opening is within a short distance of the charging pan on the balcony. The pan then is elevated at the back and the charge is guided by a chute into the furnace.

After the required amount has been introduced, the stopper is removed from the lower end, and the furnace is returned to the horizontal position, with one end coinciding with the pulverized coal burner and the other end close to the opening in the stack. The average operating or melting period for gray iron is 55 minutes. The furnace is held stationary for 15 minutes. Then it is revolved through an arc of 180 degrees and held there for 10 minutes. Thereafter it is revolved continuously until the metal is ready to be tapped. For the steel heats the operating time is slightly longer.

Air Is Heated

An individual coal pulverizer and blowing equipment serves each furnace. Secondary air for promotion of complete combustion is preheated to a temperature of 550 degrees Fahr. The escaping flame from the furnace enters a stack located close to the wall on the outside of the building. A fan inside the building draws air through a checker chamber in the stack lining. The escaping flame heats the checker chamber, which in turn heats the air flowing in to the fan and from the fan to the burner.

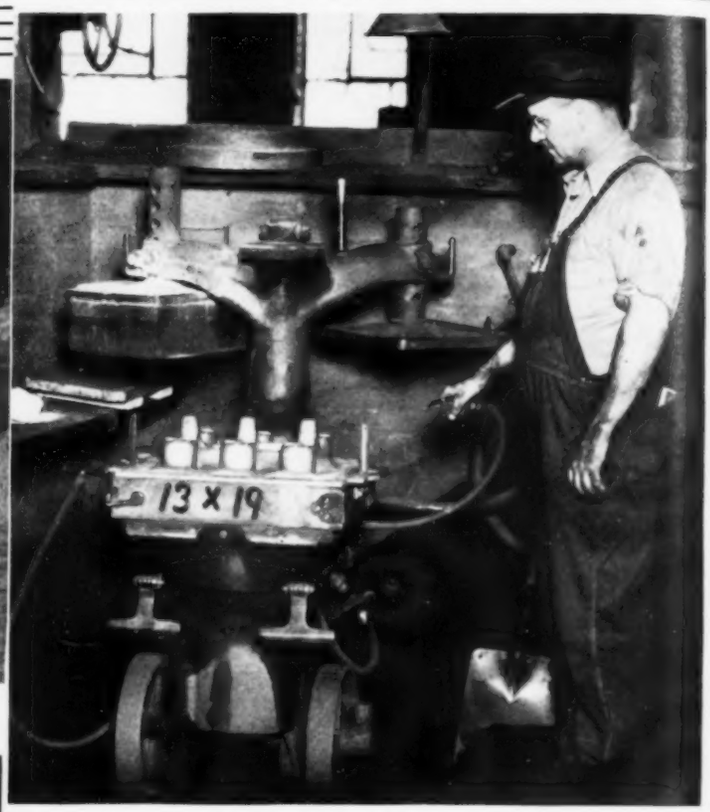
Small hub cores for the castings are made from a mixture of fine lake and bank sand in the proportion of 180 quarts of sharp sand to 60 quarts of bank sand. This batch is bonded with 4 quarts of core oil, 3 quarts of a proprietary cereal binder and 1 quart of another somewhat similar binder. The sand is mixed in a paddle type mixer made by the Baker-Perkins Co., Saginaw, Mich., and the cores are made on a core blowing machine made by the Osborn Mfg. Co., Cleveland. They are dried in a two compartment, gas fired, rack type oven. The pouring cup cores are made by hand on the bench from a somewhat similar sand mixture but containing a greater amount of binding material.

The castings are cleaned in two

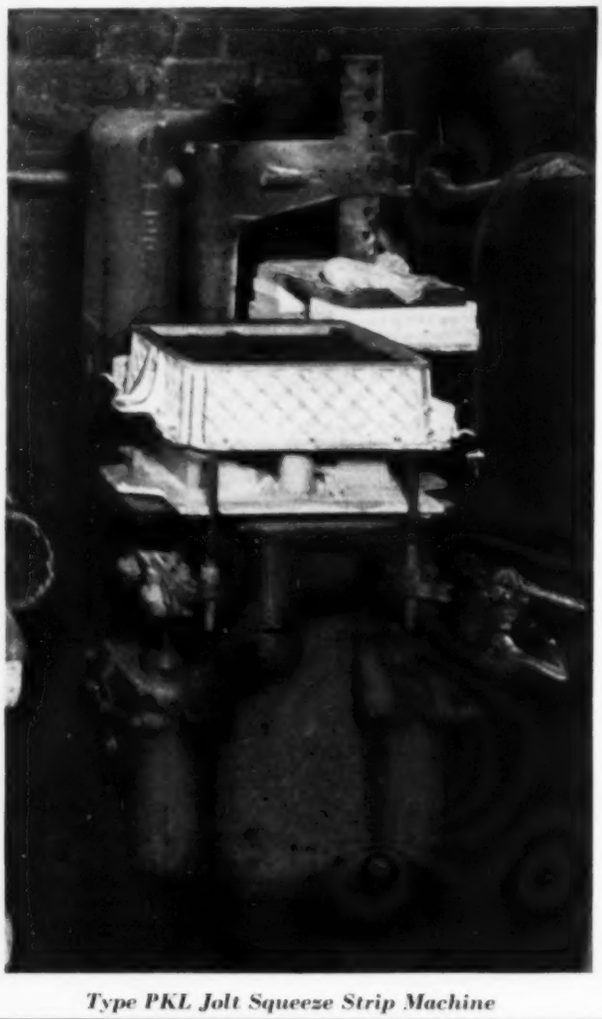
(*Concluded on page* 89)

Fig. 8—Tapered pouring cup cores and hub center cores are loaded on racks and dried in a double chamber oil fired core oven

Type G Jolt ram Power Turnover Foot Draw Machine



Type LJSD Double Head Jolt Squeezer



Type PKL Jolt Squeeze Strip Machine

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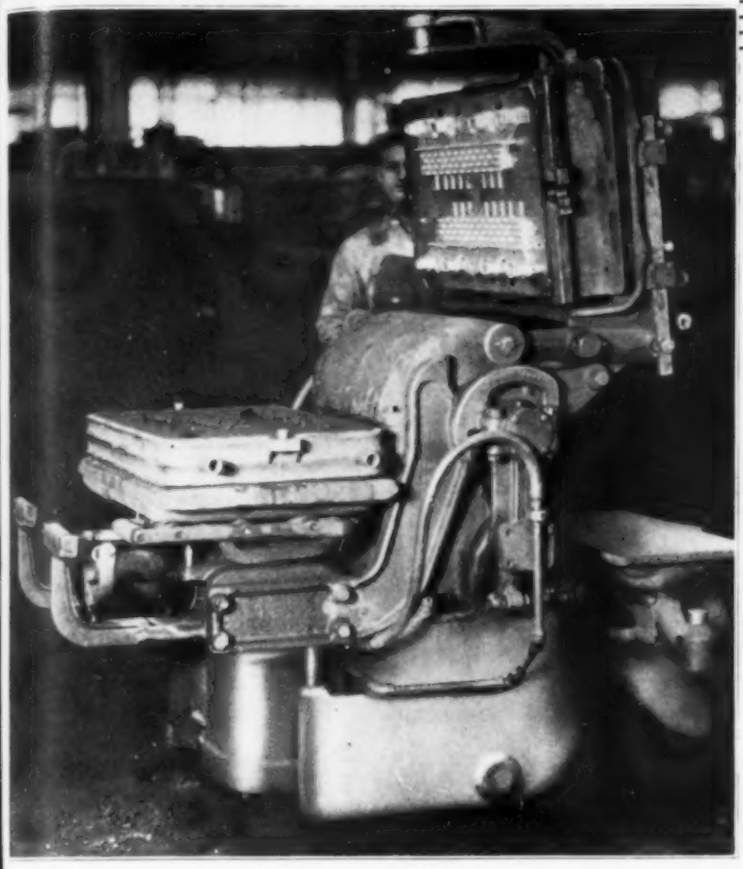

Type FH Jolt Squeeze Turnover Draw Machine

Type JDP Jolt Power Lift Machine

Type SB11 Core Blower

Discuss your perplexing foundry problems with our Sales Representatives. They are all Foundry Experts with many years of experience on all classes of work.

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"Daily heat 130 tons. Ladles formerly lined with clay and fire-sand mixture two inches thick and lined daily. Now lined with "LUXIT" ¾ inch thick and run six to ten weeks without relining. This firm required 13 men pushing ladles around the shop. Now only 11 men are required due to the fact that the "LUXIT" lined ladles hold more iron and as the thermal conductivity is so much lower the iron is more fluid and holds the heat longer."

Write us for details, and don't forget we handle LIQUITOL for alloy steel, cast iron, straight carbon steel, tool steel, and also about TESTERS for quickly testing sand moisture. *Look for our exhibit space 22 in Detroit May 4-9, 1936.*

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LIQUITOL *for better castings!*

(*Concluded from page* 85)

pressure blast chambers supplied by the Pangborn Corp., Hagerstown, Md., and in two combination tumbling and pressure blast machines made by the American Foundry Equipment Co., Mishawaka, Ind. Copper-silicon alloy steel castings are given a double heat treatment in a furnace approximately 80 feet in length and built by the Electric Furnace Co., Salem, O. This furnace fired with oil and equipped with live rollers that carry the castings from entrance to exit in a period of 6 hours is divided into several temperature zones. The castings are stacked on trays with suitable supports between to prevent them from warping or sagging.

Engineers and Foundrymen Hold Joint Meeting in Chicago

ABOUT 450 foundrymen and engineers met in the Engineering building, Chicago, on March 16 to discuss a subject of mutual interest —the application of cast metals to engineering requirements. The occasion was the second joint meeting of the Western Society of Engineers; the Chicago section, American Society of Mechanical Engineers; and the Chicago chapter, American Foundrymen's association. A similar gathering of these organizations was held a year ago. F. A. Lorenz Jr., vice president, American Steel Foundries, Chicago, and president, Steel Founders' Society of America, presided as chairman.

Despite the broad scope of the subject, the two program speakers, in their talks, presented a comprehensive picture of the types and suitability of various cast metals available for engineering use, as well as an insight into the problems encountered by the foundry in filling the requirements of the engineer. As an adjunct to the program of the meeting, an exhibit of castings, sponsored by 23 producers of the Chicago and nearby districts, showed typical examples of cast ferrous and nonferrous products.

Discussing "Selection and Application of Cast Metals for Engineering Construction," G. F. Phillips, metallurgist, International Harvester Co., Chicago, described the properties of each of the four principal classifications—steel, malleable, cast iron and nonferrous. Steel castings were divided further into the low, medium and high carbon and alloy groups. Low-carbon steel castings are limited in their application principally to products requiring surface hardness and a tough core, since superior mechanical properties are available in metal of a higher carbon content, it was pointed out.

Medium-carbon steel castings have the widest range of usefulness, their application embracing practically the entire field of engineering construction. Because of the improved physical properties resulting from heat treatment, medium-carbon steel castings rarely are used in the as-cast condition. High-carbon steel castings, containing more than 0.40 per cent carbon, have a special field of usefulness among products requiring high strength, abrasion resistance and hardness. Such applications include dies and rolls.

Use of alloys in the production of steel castings has increased rapidly the past ten years and has been instrumental in improving the quality of the castings for various applications requiring high strength and wear and abrasion resistance. The speaker described the properties of the principal low-alloy steels, including nickel, manganese, chromium, molybdenum, vanadium, etc., as well as the complex low-alloy steels containing more than two alloying elements.

Properties of Malleable Iron

Principal properties and uses of malleable iron, cast iron and nonferrous metal castings were described similarly. Ductility and machinability of malleable castings were emphasized in recommending their use in instances where resistance to shock must be provided. Gray cast iron is the most widely used of the main groups of cast irons. White iron offers higher resistance to wear but is brittle and difficult to machine. Chilled cast irons provide a combination of white iron and gray iron in a casting through different rates of cooling of various sections.

A plea for better co-operation between foundrymen and engineers was made by George Zabel, foundry superintendent, Fairbanks, Morse & Co., Beloit, Wis., in his talk on "Engineering in Its Relation to the Foundry." While admitting that losses occur in the foundry because of unsound practice, he pointed out that the engineer's lack of understanding of design problems frequently is responsible for difficulties in the production of satisfactory castings.

Designs may be unduly complicated, may be such as to result in excessive cleaning costs or may not be commensurate with sound foundry practice, the speaker pointed out. One important point which at times is overlooked by the designer is the fact that the rate of cooling of different sections of a casting varies with section size. Unequal cooling frequently will result in cracks or high internal stresses. Illustrations were presented of designs of diesel engine parts which were changed to eliminate that condition. Other instances were cited in which a small change in design permitted a material reduction in time and cost of cleaning, through the elimination of sand-trapping pockets. Additional slides were shown to illustrate castings of a somewhat complicated nature in which proper design made possible their production.

The exhibit of castings was continued through March 17 for inspection by Chicago technical students and others interested. Companies which displayed samples of their products included: American Manganese Steel Co., Chicago Heights, Ill.; American Steel Foundries, Chicago; Aurora Metal Co., Aurora, Ill.; Belle City Malleable Iron Co., Racine, Wis.; Chicago Hardware Foundry Co., North Chicago, Ill.; Chicago Railway Equipment Co., Chicago; Continental Roll & Steel Foundry Co., East Chicago, Ind.; Faunt Bros. Inc., Chicago; Frank Foundries Corp., Moline, Ill., and Davenport, Iowa; Greenlee Foundry Co., Chicago; Griffin Wheel Co., Chicago; Gunite Foundries Corp., Rockford, Ill.; Illinois Malleable Iron Co., Chicago; Liberty Foundries Co., Rockford, Ill.; Manufacturers Brass Foundry Co., Chicago; Michiana Products Corp., Michigan City, Ind.; Michigan Steel Casting Co., Detroit; Milwaukee Steel Foundry Co., Milwaukee; Sivyer Steel Casting Co., Milwaukee; Spring City Foundry Co., Waukesha, Wis.; Superheater Co., East Chicago, Ind.

Milwaukee Chapter Hears Talk On Progress

Outstanding developments in modern foundry practice were discussed by Fred J. Walls, a member of the development and research division of International Nickel Co. Inc., New York, before the Milwaukee Chapter of the American Foundrymen's association at its regular monthly meeting, March 13.

The speaker stated that progress toward closer metallurgical control over the cast product has gone hand in hand with development of the alloying principle. The practice of alloying gray, malleable, and white irons, steel, brass and bronze is now a routine procedure of modern foundry work.

Mr. Walls described and illustrated some of the important achievements in which nickel and associate alloys have contributed to the advancement of the foundry industry in recent years.

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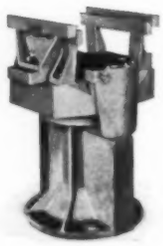
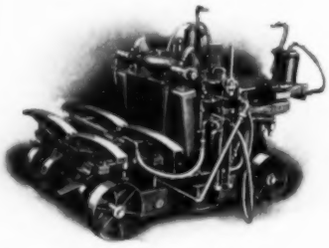
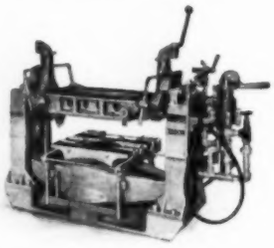


Jar Flask-Lift Machine



Hinged Jar Rollover Pattern Draw Machine

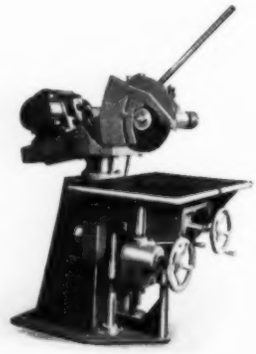
Jar Squeeze Flask-Lift Machine (Pintle Post)



Trunnion Jar Rollover Pattern Draw Machine

Plain Jarring Machine

- **SQUEEZERS . . JAR SQUEEZERS**
- **HINGED ROLLOVER MACHINES**
- **TRUNNION ROLLOVER MACHINES**
- **JAR FLASK-LIFT MACHINES**
- **JAR SQUEEZE FLASK-LIFT MACHINES**
- **PLAIN OR SHOCKLESS JARRING MACHINES**



TABOR-BRASIVE CUT-OFF MACHINE

It takes 2-inch risers off pure nickel in 12 seconds, and makes equivalent speeds on all other tough metals and alloys. It will save money for users in cutting tool steel, bakelite, wire cable, aircraft tubing, ferrous and non-ferrous castings, common or refractory brick, tile or slate, switchboard panels, marble slabs, limestone and sandstone, granite, concrete, etc. It can be furnished in several types to meet any cutting need.

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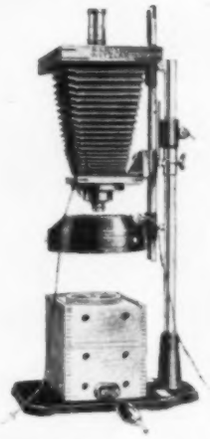

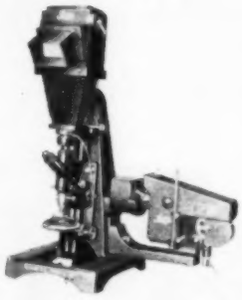

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A New Model of the "Guthrie-Leitz" Polishing Machine with greatly improved specimen holder, variable speed motor and other new improved features.

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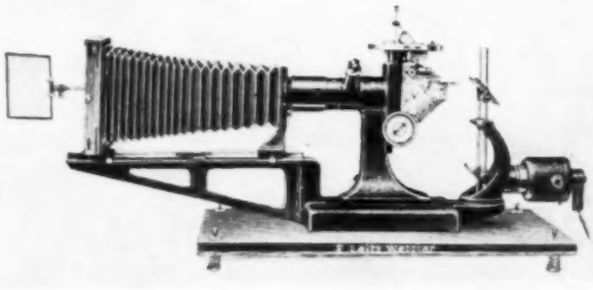
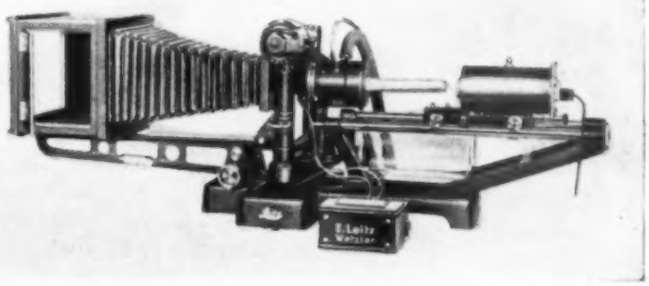
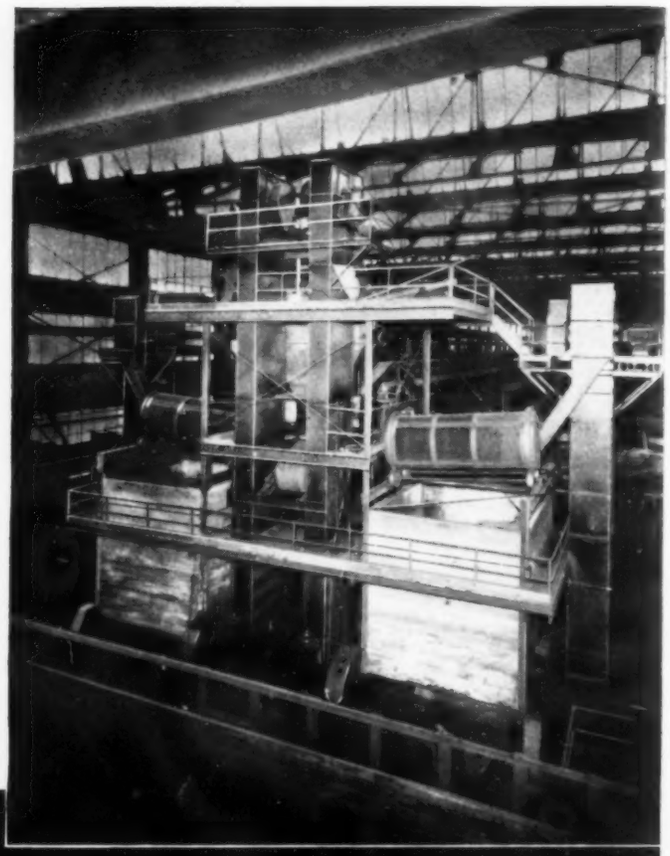




HOW TO HANDLE IT

TO GET MORE CASTINGS FROM LESS SPACE AT LOWER COST

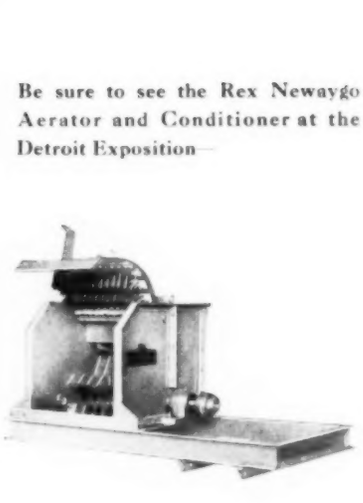


"TRIPLED OUTPUT PER SQUARE FOOT OF FLOOR AREA"

● "We saved 300% in floor space—30% in molding costs—38% in cleaning costs—and 12% in new sand by installing a Rex Foundry Sand Handling System," says the superintendent of a large Mid-Western Foundry. "This system proved to be one of the most profitable equipment investments we ever made."

Rex Foundry Engineers can be helpful in determining whether or not similar savings may be possible in your foundry. If any such possibility exists, certainly it is worth investigating—and Rex Engineers will be glad to do so at your request.

Be sure to see the Rex Newaygo Aerator and Conditioner at the Detroit Exposition—



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Chain and Belt Conveying

Gray Cast Iron (*Chapter VII*)

(*Continued from page* 45)

nuclei theory has fallen somewhat into disfavor, since most of the careful experiments tend to show that well above the liquidus it is very doubtful if free graphite nuclei can exist in molten iron, according to Piwowarsky—*Archiv fur Eisenhuttenwesen*, Vol. 7, 1933-1934, pages 431-432. However, it has been shown by Norbury that *seeding* with a small amount of graphite caused precipitation of coarse graphite. Above the liquidus we have iron with carbon, silicon, manganese, etc. dissolved in it; probably also gases such as carbon monoxide, and possibly hydrogen, nitrogen and even carbon dioxide; and certainly inclusions such as silica (probably as silicates) oxides of iron alumina, manganese sulphide, etc.

Nature of distribution of carbon in molten iron is not known. Some think carbon is dispersed atomically while others believe it exists largely as cementite. If it exists entirely in atomic dispersion the velocity of formation and crystallization as cementite must be great!

Study Aqueous Solutions

From study of simple aqueous solutions we know that it is possible to bring about supersaturation in the absence of nuclei. For example, if a solution of potassium permanganate is allowed to cool very slowly through and below its range of saturation, very large crystals will be formed. The velocity of crystallization is slow. However, if a similar solution carefully is kept free from all extraneous matter and cooled, it can be undercooled and supersaturated considerably before any crystallization will take place. Then if a few small dust particles are introduced, rapid and fine crystallization occurs. Velocity of crystallization increases rapidly as the temperature is lowered below the normal saturation limit and *seeding* with extraneous matter is sufficient to initiate rapid precipitation.

Undercooling of a melt, as apparently occurs in case of eutectiferous cast irons when superheated, then depends on a number of factors such as:

(a) Actual cooling rate.

(b) Crystallization velocity characteristics at various temperatures below the liquidus. These velocity characteristics depend further on local concentration, for example of carbon, or on the presence of dissolved substances influencing the state of aggregation of the carbon forms or modifying their thermodynamic characteristics. Fig. 34 (May, 1935) is shown to illustrate the delicate balance existing between forces, causing fine and coarse graphite to be found close together in spite of what must be minor differences.

(c) Presence of certain nuclei dispersions which may act as crystallization centers as the metal cools below the liquidus.

It was shown by Norbury and Morgan—British Iron and Steel Institute 1930—that addition of ferrosilicon to superheated cast iron resulted in formation of coarse graphite flakes. More recently O. von Keil and associates — *Archiv fur Eisenhuttenwesen*, April 1934, pages 579-584—conducted experiments which led to the conclusion that ordinarily superheating tends toward elimination of unfavorable nuclei such as silicates. Lowering of the viscosity by superheating promotes coagulation and flotation of nonmetallic impurities and their consequent removal. It is further postulated that these nuclei are dispersed as a submicroscopic *slime*. Naturally this point is not easily demonstrable by direct methods.

Some added weight to that theory is given by the facts that addition of soda ash slags, addition of calcium silicide and other agencies promoting slag coagulation and removal usually have some refining action on the grain size.

Such a fine dispersion or *mist* then is held to be disadvantageous, promoting coarse graphitization.

Table IX

Influence of Cooling and of Superheating upon Eutectic Temperature

(*Piwowarsky*)

Kind of Mold	Pouring Temperatures — Heat No. 1 2300° Fahr.	Heat No. 2 2600° Fahr.	Heat No. 3 2900° Fahr.
	Eutectic Temperatures, Degrees Fahr.		
Sand mold, heated to 932 deg. Fahr.	2165	2150	.....
Dry sand mold	2105	2095	2065
Green sand mold	2075	2060	2015
Chill mold	.....	.....	1855

Nipper—*Foundry Trade Journal*, July 5, 1934, pages 7-12—in a review of this subject advances the thought that it is possible for carbon segregation to take place when the iron is undercooled. For example in a hypo-eutectic iron the primary dendrite formation may be so rapid that the liquid remaining may be slightly hypereutectic rather than eutectic in composition, and conversely hypereutectic metals under some conditions can exhibit traces of hypoeutectic structure. That such conditions may materially affect graphite distribution is obvious.

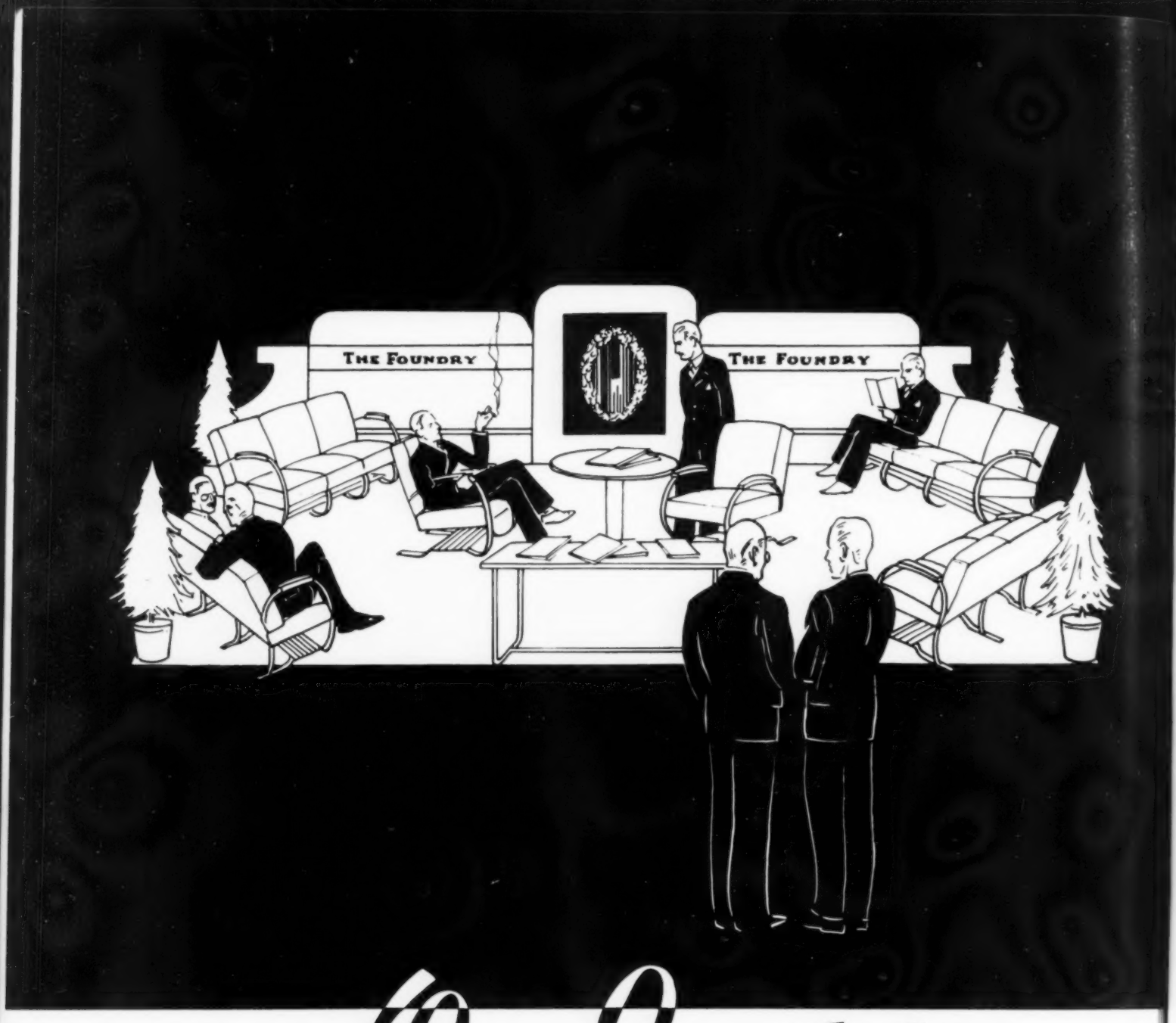
Refines the Grain

Superheating within certain ranges produces grain refinement apparently attributable to surfusion or undercooling before precipitation commences. As the undercooling increases, degree of supersaturation is increased, and once precipitation is initiated velocity is high and in irons near eutectic composition a fine graphite distribution is likely. Little time is available for grain growth and flake formation starts from many more centers than is the case with normal irons. While there usually is some increase in combined carbon, no great net ultimate stabilization of cementite is usual. Although it has been shown that inoculation by graphite can promote normal structure it is more than doubtful that graphite nuclei can exist for any appreciable time in molten iron. Insofar as submicroscopic inclusions are concerned there are reasons for hesitancy in accepting, without reserve, the hypothesis of von Keil, in spite of the demonstrated fact that removal of highly dissociated inclusions results in fine graphite dispersion.

Some metallurgists hold that in some metals, such as steels, the presence of many submicroscopic particles hinder grain growth, mechanically or otherwise. In cast iron, if for the moment, we ignore the time-temperature factor, a high nuclei dispersion from a mechanical viewpoint should promote the initial formation of many flake groupings. Structures can be shown to be grouped in distinctive groupings, a nucleus for each group rather than for each individual flake being a more likely picture of things mechanically. Even in fine grained irons these groupings are far from submicroscopic. The author—THE FOUNDRY, June 1, 1922 — illustrated the close association of distribution of graphite flakes and sulphide inclusions in gray iron and some investigators have suggested that these sulphides, existing as inclusions in molten iron, may act as nuclei.

Okochi, Sato, Honda and other Japanese investigators from time to time have called attention to the possible influence of gases in molten

(*Concluded on page* 96)



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Come to see us—ask questions—talk things over! We'll be mighty glad to see you and you'll be glad you dropped in.

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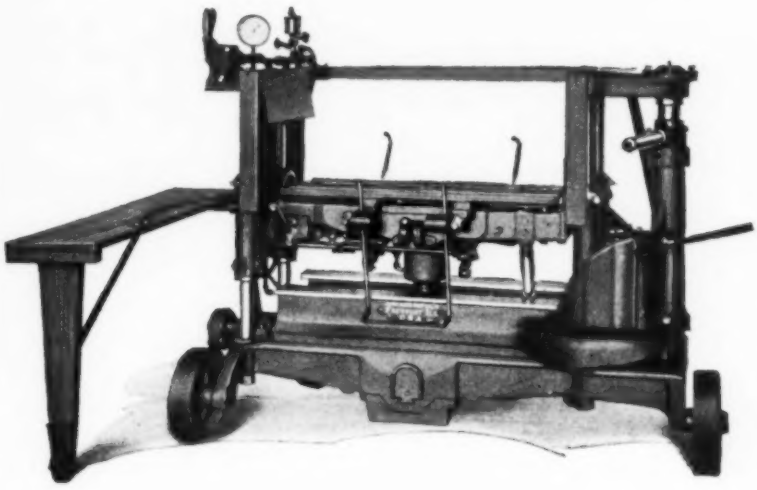
THE FOUNDRY
CLEVELAND



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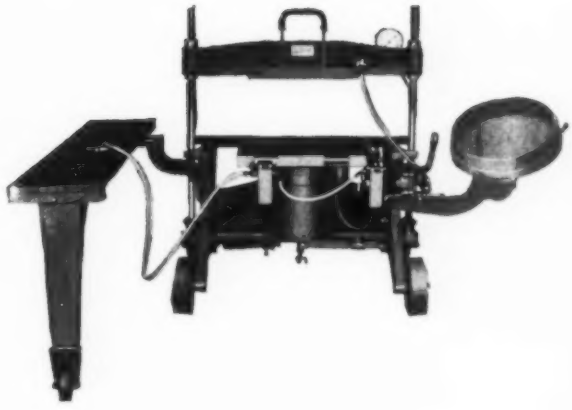
Rugged
Dependability.



JOLT ROLLOVER MACHINES

For Core
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Small Molds
Accurate Draw

ARCADE MANUFACTURING CO.

Freeport Ill. U. S. A.

(*Concluded from page 93*)

iron on its subsequent graphitization, and Boegehold, in his studies on heredity, mentions blast furnace conditions as influencing graphitization. Scheil, Ruff and Schulz—*Archiv. fur Eisenhuttenwesen*, Vol. 7, No. 6, 1933-1934—state that absorption of oxygen promotes unfavorable nuclei formation. They go so far as to suggest that inverse chilling may be due to surface oxidation during pouring. These investigators state that carbon monoxide acts in the opposite direction of oxygen.

It is thus evident that at the present time the explanations of the effects of superheating are speculative, and roughly divided into two groups. One is the nuclei—supercooling theory. The other includes the theories which consider the seeming supercooling effect due to disturbance or change in equilibria in the molten and solidifying metal, which affect the stability of the cementite, or modify the cementite-graphite reactions, thus of course affecting graphite formation. It might be mentioned that superheating is not the only factor, aside from composition which materially affects the nature of graphitization.

The iron-graphite system is the ultimately stable system, as shown by many experiments, and deducible from thermodynamic considerations. However, the metastable or iron-cementite system is more rapid in formation, hence on undercooling is more likely to be formed first. As shown by the author the distribution of graphite resembles the distribution of cementite. It therefore seems likely that the effects of superheating affect the fineness of the ledeburite structure, and on decomposition of this the effect is transmitted, as it were, to the graphite distribution. Normally on superheating an initial effect is that of raising the combined carbon. At higher superheats the graphite-ferrite structure may prevail. This is explainable on the basis of contact area of precipitated graphite, shorter migration paths for precipitating carbon, and probably slower cooling rate.

Presents Study Of Townsend Scheme

National Industrial Conference Board Inc., 247 Park avenue, New York, has published study No. 219 on the operation and characteristics of the Townsend plan. Included in this discussion are statements as to what the plan proposes and how it is expected to operate, who would be the pensioners, how the plan could be administered, economic effects of the scheme, and the plan and the national income. A brief summary at the close of the pamphlet points out reasons why the plan is economically unworkable.

A.S.T.M. Committees Hold Pittsburgh Meetings

As a result of a number of meetings of standing committtees of the American Society for Testing Materials, held in Pittsburgh March 2-6, many new standard specifications and methods of tests are to be recommended to the society. A total registered attendance for the group meetings was approximately 625, exceeding that of any previous year.

The symposium on high-strength constructional metals was the technical feature of the regional meeting March 4, at which five papers were presented on the following subjects: "Alloys of Aluminum and Magnesium", by E. H. Dix Jr., chief metallurgist, and J. J. Bowman, metallurgical division, Aluminum Co. of America, Buffalo; "Alloys of Copper", by G. F. Geiger, research and development department, International Nickel Co., New York; "Carbon and Low-alloy Steels", by E. F. Cone, editor, *Metals & Alloys;* and "Corrosion-resisting Steels", by E. E. Thum, editor of *Metal Progress*.

The research committee on fatigue of metals reviewed various comments which had resulted from the 1935 report of the committee, which presented a set of notes on the rotating-beam tests for fatigue strength, covering tests on machines either of the centrally loaded or the cantilever type.

A progress report was presented covering the co-operative studies of the committee on metallography and the fatigue committee, involving X-ray diffraction studies and their relation to fatigue test results. While no clear correlation has as yet been shown, the study is progressing. It was indicated that long-time tests are necessary to enable definite conclusions to be drawn.

The committee on malleable iron castings, through its subcommittees on galvanizing embrittlement and specifications for malleable castings for flanges, pipe fittings, and valve parts, has continued its study of galvanizing embrittlement as related to malleable iron. The committee is continuing actively in the development of specification requirements for cupola malleable iron. These matters were discussed at this meeting.

The committee on copper and copper alloys, through its subcommittee on cast metals and alloys, in co-operation with representatives of the American Railway Engineeering association and the American Association of State Highway Officials, has made a thorough study of specifications for cast bronze bearing metals. The available specifications on this subject were reviewed and as a result of this work a new specification has been prepared, covering four classes of bronze castings for turntables and movable bridges. This is to be presented as a tentative specification and it is proposed to discontinue the present standard specifications for bronze bearing metals for turntables and movable railroad bridges.

This committee also has given detailed consideration to specifications for bronze castings for locomotive and journal bearings, and action has been taken to report revised specifications covering lined journal bearings and bronze bearings for locomotives, to replace the society's existing standard specifications for bronze castings in the rough for locomotive wearing parts and for car and tender journal bearings, lined. These new specifications will conform to the corresponding specifications on this subject of the Association of American Railroads, mechanical division.

The following tentative specifications and revisions of standards now existent will be recommended to the society for adoption as standard if the letter ballot of the committee of copper and copper alloys is favorable: Tentative specifications for copper-base alloys in ingot form for sand castings; tentative revision of standard specifications for sand castings of the alloy (copper, 88 per cent; tin, 8 per cent, and zinc 4 per cent); tentative revision of standard specifications for steam or valve bronze sand castings; tentative revision of standard specifications for composition brass or ounce metal sand castings; and immediate revision of standard specifications for aluminum-bronze castings: (change in iron content requirement of grade B).

The standard specifications for yellow brass sand castings for general purposes are to be revised and reissued as tentative specifications. In preparing this revision, the committee has been guided by the fundamental principle that the chemical requirements constitute merely a guide to the type of alloy and the physical requirements shall govern acceptance of the castings. Likewise, the existing specifications for manganese-bronze ingots for sand castings are to be revised and will be published as tentative standards.

A well-attended meeting of the committee on die-cast metals and alloys was held, at which it was decided to recommend a continuation as tentative, for another year, of the specifications for aluminum-base alloy die castings. Certain changes are to be incorporated in the specifications with the dropping of alloy No. 7, modification of the composition of alloy No. 12 and certain modifications in the tables of properties.

To Conduct Courses

St. John X-Ray Service Inc., 30 Thomson avenue, Long Island City, N. Y., will conduct two practical training courses in metal radiography at its laboratory during the summer. One will be held for those attending the A.S.T.M. meetings during the week of July 6 and the other during the week of July 13.

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TRADE ABRASIVE MARK REGISTERED

Auto Pistons Cast Horizontally

(*Continued from page* 51)

these pistons are poured in a horizontal position, thus violating all theory, tradition and custom connected with castings of this character. Foundrymen who have not actually seen the performance, even those with only elementary foundry experience, find it hard to believe that these green sand cores, attached to the mold only at one end, maintain their position without the aid of nails, spikes, rods, arbors or any other type of reinforcement.

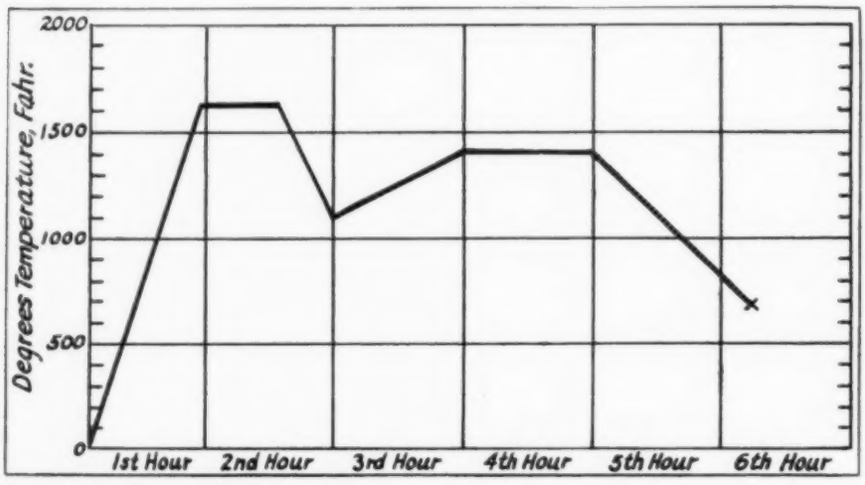

Fig. 7—Range of temperatures to which castings are exposed during annealing period

The department at the north end of the foundry devoted to the production of the pistons, is partitioned from the remainder of the building and is air conditioned to maintain a constant temperature. A pendent type of conveyor carries the molds outside the chamber where they are poured and shaken out. In this manner any dust or smoke incident to the latter part of the process is excluded from the room in which the molds are made.

The conveyor carries the empty flasks back to the molding stations. Sand falls through a grating on to a belt which carries it to the sand reconditioning apparatus on the second floor. The castings also are taken aloft to the second floor where they are heat treated and cleaned.

Molds for the pistons are made on two adjacent units, one for the drags and the other for the copes. Each unit is equipped with a sand slinging machine. Patterns on machines are mounted on a turntable in a manner that has become familiar in a wide variety of instances in recent years. On the molding machines the drag machines are of the rollover type, where the drags with green sand cores standing in place are lowered away from the pattern. On the cope machines the copes are lifted away from the pattern plate.

The pattern for making the combined drag and green sand cores is shown in Fig. 4. Six of these duplicate pieces of pattern equipment pass in rotation under the nozzle of the sandslinger and through the other stages incident to the production of each mold. The operators stand on the inside of the circle and perform their various duties in the following order: No. 1 sprays the pattern with kerosene oil. No. 2 covers the pattern with riddled sand. No. 3 packs the sand under the wrist pin bosses with a small wood rammer. No. 4 manipulates the sandslinger to fill the flasks with sand. No. 5 scrapes off superfluous sand to present a perfectly flat surface. No. 6 vents the core with a double wire, rolls the assembly over and removes the drag from the machine.

In the early experiments a sprue cutter was employed to form an opening in the center of each core, partly as a vent passage and partly to permit the core to crush more readily. However, it was found that the opening in the core disturbed the delicate balance between a core that would adhere to the drag, and one that would not stay in place. Hence this feature was omitted and replaced by the twin wires set in a fixture that guides them into a body of sand in each core between the wrist pin bosses.

The nicest control is necessary to hold the sand in ideal condition, moisture, permeability and green sand strength. If the sand is too hard the thin and tender casting will crack. If the sand is too soft the casting will be over size and over weight and will be rejected. A slight excess in the degree of moisture or density will cause the metal to flutter with resulting pin holes in the machined grooves for the oil rings.

The rough casting weighs 650 grams, while the finished weight is held between 301 and 305 grams. The thickness of the finished wall is held between 0.030 and 0.035-inch. The outside diameter of the rough casting must not exceed the anticipated measurement by more than 0.010-inch.

Green sand for securing such a fine degree of accuracy is rammed harder than usual for green sand practice. Physical characteristics of the particular sand employed show permeability 65 bond 9 to 10 and moisture between 2.8 and 3 per cent according to American Foundrymen's association standards. In closing one part of the mold, a feature to be touched upon more in detail later, the drag with suspended cores is lowered into the cope. Later the entire mold is turned up on end for pouring. The green sand cores without any apparent support, retain their position whether hanging vertically from the face of the drag, or extending horizontally from the same face.

(*Concluded on page* 103)

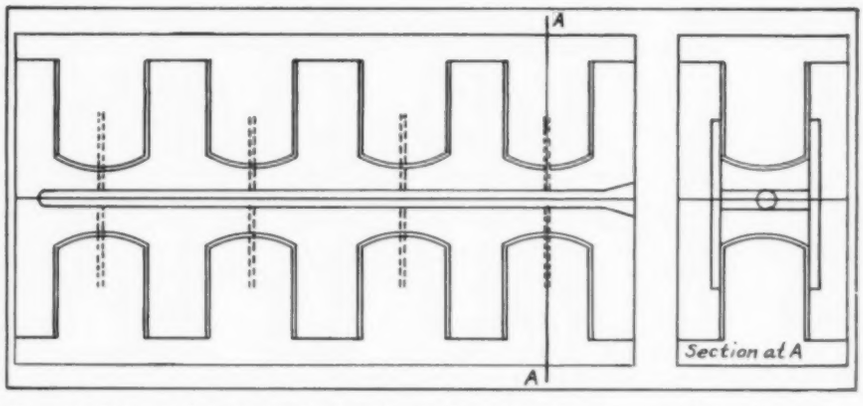

Fig. 8—Side and end sectional views of mold showing position of runner and gates

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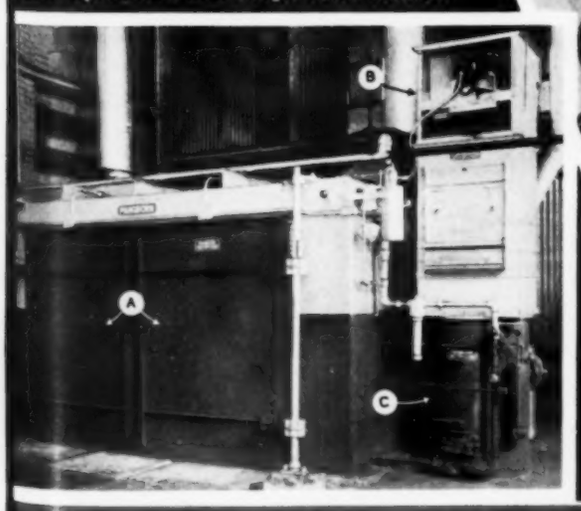

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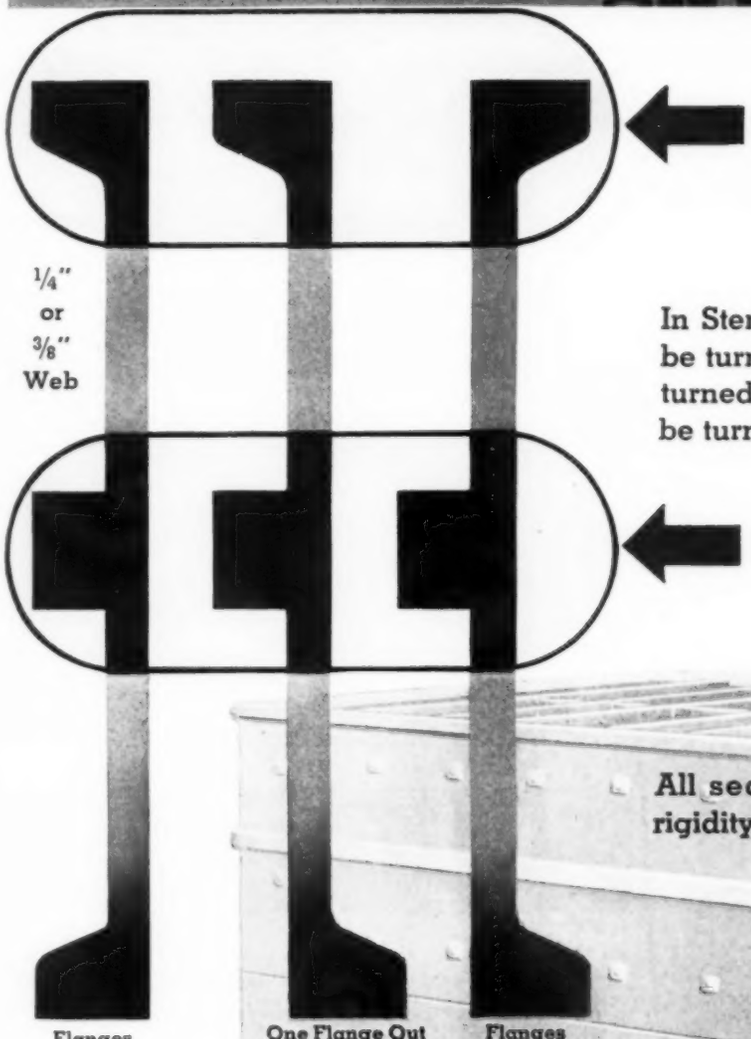

Heavy rolled square flanges give full width bearing, permit accurate machine finish and cannot curl under jolt action.

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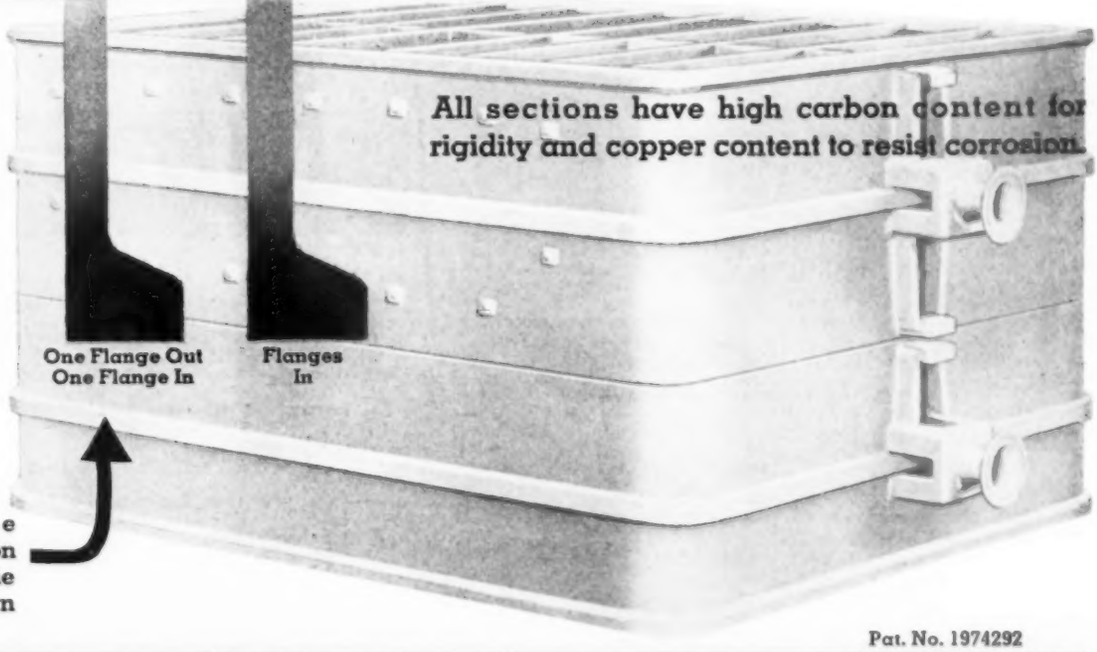

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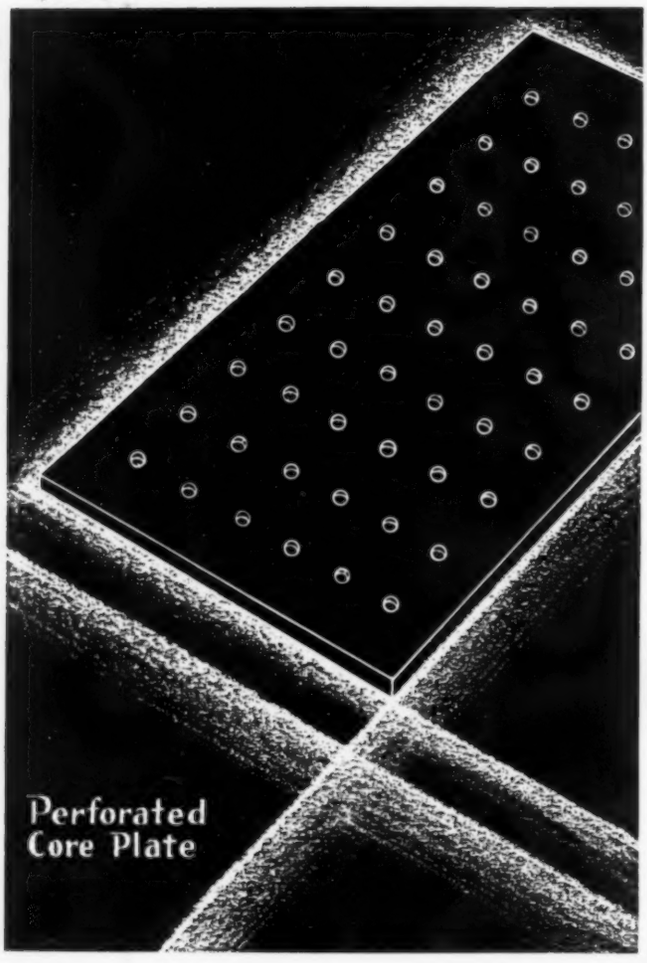
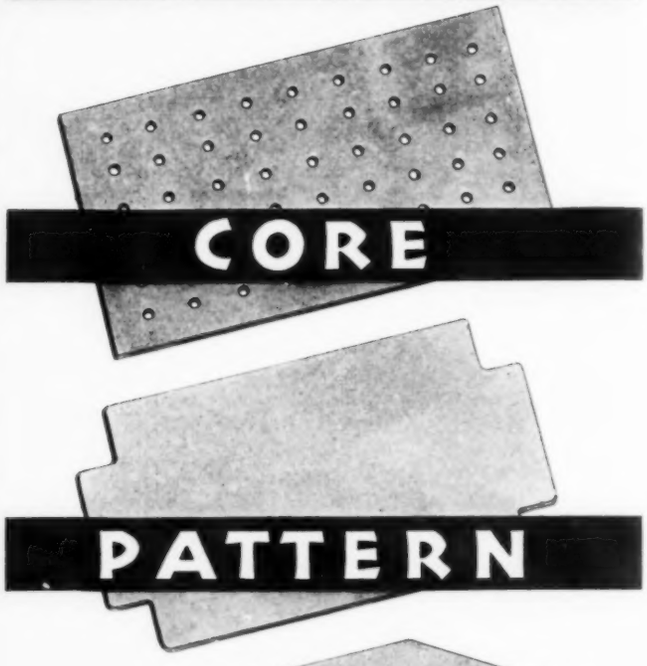


MOLTRUP



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You will have learned for yourself that they do these things and that in so doing they save you money and consequently earn for you an *extra* profit.

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MOLTRUP

(*Concluded from page* 98)

The pattern equipment for making the cope is shown in Fig. 3. The vertical slots on opposite sides of each pattern are seats for the gate pattern. The tapered, pouring end of the runner rests in a gap in the center of the upper edge of one end of the flask. Branches from the main runner extend over each pattern and terminate in small gates which rest in the slots shown. The upper face of the runner and branches is flush with the upper face of the cope. Hence when the superfluous sand is scraped from the cope, the runner pattern is exposed and may be removed. In assembling the mold for pouring, two copes are placed back to back. The runners in both cope faces coincide to form the desired closed passage for the metal.

The entire process presents so many peculiar features, and differs so radically from routine foundry practice that it is rather difficult to describe without detailed drawings showing the various steps in the cycle of operations.

Briefly, the copes and drags as they leave the machines are placed on a rack between the molding units and leading to a pendent type conveyor close to the wall of the building. The fixture on which the mold is assembled is pivoted to the vertical conveyor member and may be moved through an arc of 90 degrees. It is balanced so nicely that scarcely any effort is required to move the mold from a horizontal to a vertical position. A small rib projecting from the face of the plate near the lower end prevents the mold from slipping when it is upended. A threaded bolt in the center of a swinging, hinged plate binds the various parts of the mold together and in contact with the first plate.

A drag with the green sand core in place is lifted from the rack and placed on the conveyor unit. A cope is lowered into place on the drag in the usual manner. Main channel and branches of the runner are exposed to view on the top face of the cope. At this stage one of the peculiar features of the process is introduced. A second *cope* with the ordinarily considered top side on the bottom, is placed on the first cope. The runner passage—one half in each cope face—now is complete. A second drag then is lifted from the rack, and with green sand cores suspended from the face is lowered into the cope apparently in direct defiance to the well known law of gravity.

Faced with a similar problem, the average molder unhesitatingly would declare it outside the scope of practical accomplishment. A daring, experimentally minded molder cautiously might admit that the feat was remotely possible, but he would not care to be quoted in such a radical view.

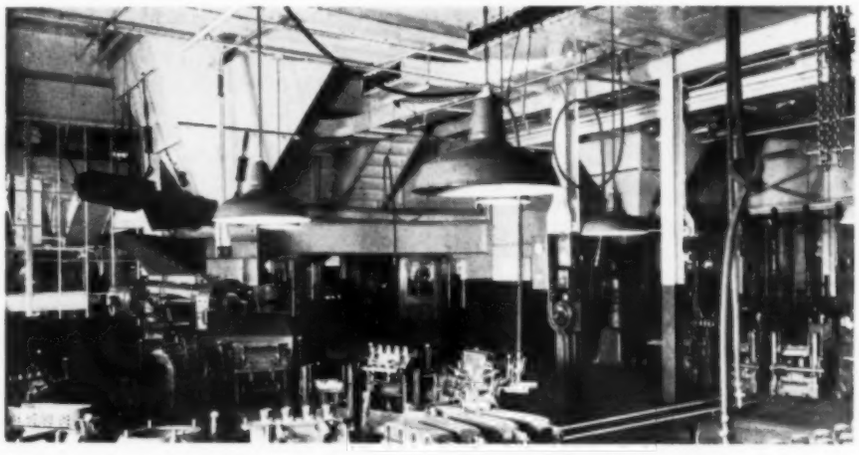

Fig. 9—Mold parts from the machines are placed on a skidway before they are assembled on the conveyor

In the Ford foundry thousands of pistons are molded and cast in this manner every day and it is claimed that the casting loss from all causes does not exceed 2 per cent.

A short distance from the assembling point the molds enter the pouring zone. Metal is melted in a battery of four electric furnaces. The metal is conveyed to the vicinity of the pouring zone in 1000-pound capacity ladles suspended from a monorail. Here it is transferred to hand ladles and poured into the molds each containing 8 pistons.

The metal is a special alloy steel conforming to the following analysis: Carbon 1.35-1.70 per cent, silicon 0.90-1.30 per cent, sulphur 0.08 maximum, phosphorus 0.10 per cent maximum, manganese 0.60-1.00 per cent, copper 2.50-3.00 per cent, chromium 0.15-0.20 per cent. In the as cast condition the castings are hard and brittle. After a suitable heat treatment the castings are readily machinable and show a brinell hardness number of 207 to 241.

Castings are heat treated in a gas fired furnace 81 feet 5 inches in length outside, 65 feet ¾-inch inside and the moving mechanism is geared to carry the castings through from elevator to elevator in a period of 5½ hours. In the first hour they are raised to a temperature of 1650 degrees Fahr., and held at that temperature for ½ hour. In the succeeding half hour they are lowered to a temperature of 1100 degrees Fahr. and during the following hour are raised again to 1400 degrees. They are held at this temperature for 1 hour and during the following 1½ hours are lowered to 1000 degrees. They are removed from the furnace at a temperature between 700 and 800 degrees.

For heat treatment the castings are loaded on double deck trays 31 x 34 inches with 200 castings on each tray. The furnace has a capacity of 28 trays, or a total of 5600 castings, approximately 1000 castings per hour.

A.F.A. Awards Two Gold Medals

(*Concluded from page* 43)

the country, he conceived the idea of incorporating the results of his melting and foundry experiences in book form for the benefit of foundrymen everywhere. In 1908 he organized McLain's System to provide a correspondence course in mixing irons, cupola practice and the production of semisteel, the forerunner of modern high test cast iron.

Through his educational work, Mr. McLain has been instrumental in training thousands of men in the proper methods of mixing and melting iron for castings. Following the development of his course in iron melting practice, in 1910 he completed his system of steel foundry practice, giving advice on making steel castings by the electric furnace, open hearth and converter processes. He is equally well known in Europe and America and is an honorary member of the Institute of British Foundrymen.

Valve Specifications

The second resubmission of the proposed federal specifications for bronze valves, angle and globe, 150-pound pressure (for land use) has recently been issued. These specifications have not been adopted or approved, and are subject to further revision. Consisting of nine major departments, they include applicable federal specifications, material and workmanship, general requirements, detail requirements, methods of sampling, inspection and test, packing and marking of shipments, requirements applicable to individual departments, and notes.

European Foundry Practice

Digest of recent literature covering various phases of castings manufacture

Roll Making

British Firm Acquires Rights Development in Roll Manufacture, *Metallurgia*, November, 1935.

R. B. Tennent Ltd., recently acquired manufacturing rights in Great Britain for iron and steel rolls made according to formulas held by the Mackintosh-Hemphill Co., Pittsburgh. F. C. T. Daniels, research and development engineer, Mackintosh-Hemphill Co., personally supervised the installation of the process and equipment and the production of the first rolls.

Demand for a better finish, longer life and higher tonnage from rolls, induced James Tennent, managing director R. B. Tennent Ltd. to investigate manufacturing processes and products in the United States and on the continent of Europe. Performance of the rolls made according to the Mackintosh-Hemphill formula resulted in his acquisition of the rights to manufacture these rolls for British users. This move is in line with the firm's practice of keeping abreast of the times. Founded in 1857 by the late R. B. Tennent, the firm steadily has grown, specializing mostly in all varieties of iron and steel rolls. The plant now is the R. B. Tennent, Ltd., Whifflet Foundry, Coatbridge, Scotland.

Developed and patented in the United States in 1913, it is claimed that this type of roll brought about what practically was a revolution in the use of rolls for nearly all purposes. Rolls produced from the special alloy set remarkable tonnage records in various operations from booming mills to finishing shapes on small guide mills. Pittsburgh Iron & Steel Foundry Co., originators of the process, was absorbed by the Mackintosh-Hemphill Co., in 1922 which since has continued to manufacture the rolls in large numbers.

Rolls are made with either a steel or a cast iron base. All grades of each type have the same low phosphorus and alloy content, but differ in the proportion of silicon and carbon, in the melting furnace manipulation and in the subsequent heat treatment. The steel base rolls have the carbon wholly combined. Scleroscope hardness varies from 32 to 35 depending on the anticipated service. The structure is entirely homogeneous and of the same hardness throughout. Hardness for blooming mills is 32, structural roughing mills 35, intermediates 42, finishers 48, while special service rolls, such as tube mill sizers may show a scleroscope of 55.

Iron base rolls are classified as chill and grain. They have as a base low phosphorus chilled cast iron mixture alloyed with nickel and chromium. They differ from the ordinary chilled roll in that there is no distinct line of demarcation between the outer layer and the gray center. It is claimed they are 30 per cent stronger than the ordinary chilled iron roll. Deep passes may be cut, with only a slight difference in hardness between the top and the bottom of the groove. Actual surface hardness is from 60 to 70 scleroscope. The grain rolls are similar to the chilled rolls in their outstanding properties. They are used mostly in the larger sizes and the collars and grooves are cast close to shape.

Considerable volume of new equipment has been installed, heat treating furnaces, etc., for handling rolls by the new process. Metal for the steel base rolls is melted in a 50-ton capacity open hearth furnace. Iron for the chill and grain rolls is melted in four reverberatory furnaces and two cupolas. One of the reverberatory furnaces has a capacity of 40 tons, said to be the largest in Great Britain. The heat treating furnaces are fired with oil, and thermostatically controlled.

Pouring Time

Pouring Time and Gate Section (*Temps de Coulee et Section d'Attaque*), by Guy Henon. *La Revue de Fonderie Moderne*, Paris, Dec. 25, 1935.

The author discusses in this article, the limits for pouring time and the factors upon which this time is dependent. He states that the upper limit is contingent upon the temperature and castability of the iron, necessity for enabling the metal to rise in the mold at a certain speed, capacity of the pouring equipment (ladles, cranes, etc.), and the necessity for thermic homogeneity in the casting. The lower limit is governed by the time necessary for evacuation of air and gases from molds; possibility of displacement of chaplets or core prints; possibility of erosion of the mold and cores; and hammer effect at the time the mold is filled.

Between the upper and lower limits there is an optimum pouring time, and various formulas have been devised for the purpose. These formulas are reviewed, and it is pointed out that none of them applies to all cases or types of casting.

The author gives a diagram in which weights of castings without gates and risers, but with heads, are given on the abcissae, and the pouring time on the ordinate. On this diagram certain lines, or zones, represent the formula in relation to pouring time and weights of castings, within the limits in which they are correct. Actual measured times for experimental castings of known weight are shown on this diagram by crosses; actual measured times for types of castings, for which the best conditions of pouring are known, are also shown, each type giving a small zone in the diagram.

The diagram shows that the Dietert formula applies practically all over the diagram for castings ranging from 500 grammes to 20 tons. Therefore, this formula is useful as a first approximation. However, in certain cases it requires to be corrected, for it takes no account of the thickness of the castings, nor the height, nor the number and shape of cores, etc.

Firstly the Dietert formula is taken as follows: $T = 2\sqrt{P}$ where T is the pouring time in seconds and P the weight of the casting in kilograms. Then measure the average speed, V, with which the metal rises into the mold by dividing the height of the casting by T; verify if V is in accord with good practice—that is, 10 to 20 millimeters per second for castings having thicknesses ranging from 10 to 40 millimeters. Finally, make the necessary corrections in the method of pouring, in order to obtain the correct rising speed.

Certain further corrections must be

(*Concluded on page* 106)

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(*Concluded from page* 104)

made in special cases: For very thin castings, pouring should be effected more quickly; for very heavy castings, it also is advisable to pour quicker to save time, but the temperature of the metal should then be not too high.

As regards the section of the gate, many formulas exist to calculate this, but many are incomplete. There are a large number of factors governing gate size, and as a result of experience it would seem that a speed of flow of 1.5 kilograms per square centimeter per second is a good average figure to start from. A practical formula is recommended:

$$S = \frac{P}{T \times d}$$

in which S is the medium section in square centimeters, P the weight of the casting in kilograms, T the pouring time, and d the speed of flow as previously indicated. It is on the latter factor that corrections can be made. When the section of the choke is smaller than that of the gate, S is the sum of choke areas when the section of the choke is larger than that of the gate, S is the sum of the sections of the filter holes or the sum of the gate sections.

Brass Foundry Practice Is Discussed

R. W. Parsons, metallurgist, Ohio Brass Co., Mansfield, O., spoke on "Brass Foundry Practice," at the regular meeting of the Northeastern Ohio Chapter of the American Foundrymen's association, held at the Cleveland club, Cleveland, March 19. Walton L. Woody, National Malleable & Steel Casting Co., Cleveland, presided.

The speaker dealt with the production of brass castings at the Ohio Brass Co. He first discussed the two main departments, namely railway and valves, the former dealing principally with trolley overhead material, electric railway and transmission equipment. Four arc type electric furnaces and four crucible furnaces are used for melting metal free from lead or zinc. The temperature of every pot of metal is tested and a check made at the pyrometer station. In connection with the induction furnace, of which the company operates three, it was stated that the addition of a small amount of phosphorus in the furnace brought better results. The speaker also discussed the molding floors, sand preparation, shakeout and the reclamation of metal from sweepings and skimmings.

Russell F. Lincoln, Osborn Mfg Co., Cleveland, chairman of the chapter transportation committee for the Detroit convention, announced that the A.F.A. is offering three prizes for chapter attendance at the national meeting. All members of the Northeastern Ohio association were urged to attend.

It also was announced that a chapter outing is planned for Saturday, June 20, at the Lake Forest country club, Hudson, O.

Equipment Talks Feature Iowa Meeting

Four speakers featured the March 16 meeting of the Quad-City Chapter of the American Foundrymen's association, held at the Blackhawk Hotel, Davenport, Iowa. Clyde Burgston introduced the speakers, all of whom discussed different aspects of foundry cleaning equipment.

W. E. Naylor, Beardsley & Piper Co., Chicago, talked on shakeouts and vibrators. Equipment was described by the use of diagrams showing the construction and operation of the vibrator as used in the foundry.

J. W. Wagner, Pangborn Corp., Hagerstown, Md., discussed the airless rotoblast cleaning barrel, explaining with the use of slides the complete operation and construction of the unit.

D. J. Reese, Whiting Corp., Harvey Ill., spoke on tubular dust filters. He presented construction features of this new equipment and compared it with old types. He gave reasons for the trend toward this new type and emphasized cost in reference to this particular mechanism.

E. B. Rich, American Foundry Equipment Co., Mishawaka, Ind., stressed the wheelabrator method of cleaning castings, a product of his company. He gave a complete description of this method and discussed operation and cost in regard to its field of use.

At the February meeting of the chapter, D. G. Anderson, Western Electric Co., Chicago, talked on "Fundamentals of Foundry Practice Technique." The chapter will hold a joint meeting with the American Society of Metals, April 20.

Book Review

Industrial Medicine, by W. Irving Clark and Philip Drinker, cloth, 262 pages, published by the National Medical Book Co. Inc., New York, and supplied by THE FOUNDRY, Cleveland, for $3.00 plus 15 cents postage and in Europe by the Penton Publishing Co. Ltd., London.

While this book is written particularly to serve as a handbook or reference book for the general practitioner who is entering industrial medicine, it does provide valuable information to the management of industrial concerns operating or inaugurating medical departments. The authors have endeavored to clarify the general practitioners knowledge of what industrial medicine is, to assist him in understanding the conditions under which his patients work, to discuss his contacts with industrial medical departments when one exists in a neighboring industry, and to inform him of standard practice in the industrial field of medicine.

Industrial medicine is defined simply as complete medical service to the industrial unit involved.

It is pointed out that the medical problems in the industrial plant may be divided into two groups, namely the maintenance of the health of the workers and the diagnosis and treatment of minor sicknesses and injury. Prevention of industrial disease is largely an engineering problem, as its basis is the separation of the toxic or irritating substances from contact with the worker. The industrial medicine department, however, must co-operate with the engineering department by discovering the health hazard, determining its distribution and pointing out its origin. Then the engineer is able to eliminate the source of danger.

The authors have discussed the following subjects: Industrial medicine departments; industrial surgery; industrial medical service; industrial diseases; dusts; pneumonoconiosis; lead and metal fume fever; industrial dermatosis; gases; benzol; asphyxia and artificial respiration; prevention of industrial diseases. An extensive bibliography also is included.

Connecticut Group Considers Core Problems

L. P. Robinson, sales manager, Werner G. Smith Co., Cleveland, presented an interesting talk on "Core Room Troubles" at the March 17 meeting of the Connecticut Nonferrous Foundrymen's association, held at the Hotel Garde, New Haven, Conn. T. Joseph Judge, president of the association, presided.

Mr. Robinson emphasized the importance of selecting the proper grade of sand for cores. He stated that the grain size should be such as to produce the correct permeability, and at the same time result in a satisfactory finish on the casting. The speaker stated that improperly baked cores cause most of the scrap castings attributed to the core room.

The next meeting of the association will be April 21, and will discuss "Air Conditioning and Dust Control." John Kane, American Air Filters Co., Louisville, Ky., will speak.

A Message to Foundrymen Coming to Detroit for the Show

For the inspection of Foundry men from everywhere Sterling will exhibit many kinds of wheels used in foundries in the United States . . . Wheels that have broken records for life, cutting action and low grinding cost. Sterling invites Foundrymen to study the structure of a product continually improved for cleaning room efficiency.

THE STERLING GRINDING WHEEL COMPANY

Abrasive Division of The Cleveland Quarries Company

Factory and Office TIFFIN, OHIO CHICAGO: 135 North Wacker Drive DETROIT: 101-107 West Warren Avenue

STERLING ABRASIVES

DON'T MISS THE STORY OF THE BIG SHOW

The May (Post-Convention) Issue of THE FOUNDRY

No issue of THE FOUNDRY throughout the entire year holds more interest and permanent value to our readers than the Post-Convention—this year the May issue.

● To those who are fortunate enough to attend these great conventions and exhibits of The American Foundrymen's Association, the Post-Convention issue of THE FOUNDRY is an illustrated and accurate record of what they have seen and a souvenir of a pleasant week of renewing old acquaintances, making new ones and viewing the latest in foundry practice, equipment and supplies.

To those who find themselves unable to get away for "foundrymen's week," the Post-Convention issue of THE FOUNDRY *is* the Convention and even though they miss some of the "thrill of the crowd," they are just as well informed as to what happened; what's new in methods and equipment, etc., as those who are there. The reason for this is that the Post-Convention issue of THE FOUNDRY carries a detailed report of each session, summaries of the discussions, reports of the many active committees that are directing the technical trend of the industry, news of the daily happenings and official actions and a critical view of all that is new in foundry equipment shown at the exhibition.

As an advertising opportunity there is none more desirable. The eyes of the foundry industry of the world are focused on the A. F. A. convention and the entire foundry universe reads the Post-Convention issue with keen interest and an eager mind. Space reservations should be made at once.

● *The advertising forms of the May Post-Convention issue of* THE FOUNDRY *close on May 4th.*

THE FOUNDRY ... CLEVELAND

Air by the POUND? *SURE!*

Hotter Iron **Faster Melting**

Less Coke **More Uniform Analysis**

Less Power **Better Castings**

Be sure to see our full size cupola blower with constant air-weight control which we will have in operation at the A.F.A. Convention.

MOTOR BLOWER

CHECK the points mentioned above and let us show you the savings possible by constantly controlling the *weight* of the air supplied to your cupola.

It has formerly been the belief that constant *volume* of air alone was sufficient to insure best results. It is now a definitely proven fact that the amount of oxygen changes considerably and fluctuating atmospheric temperatures mean that too much or too little oxygen is being delivered to the charge. Either way you are not getting the maximum B T U content from your coke. The results are oxidation of your iron, wasted fuel, a considerable power loss and also, many times, a variation in the analysis of the iron itself, especially in these days of intricate and accurate alloying.

The Ingersoll-Rand Motorblower with Constant Weight Control automatically and constantly weighs the air passing through the blower and regulates blower operation to provide maximum efficiency.

So many foundries report savings and at the same time better castings as a result of the installation of Motorblowers with the air weighing attachment, that we are offering the services of our engineers to show you what Ingersoll-Rand equipment can do for you. An accurate report will be submitted and this "check-up" puts you under no obligation or expense.

Communicate with our nearest office.

117-1

Birmingham	Denver	Mexico	San Francisco
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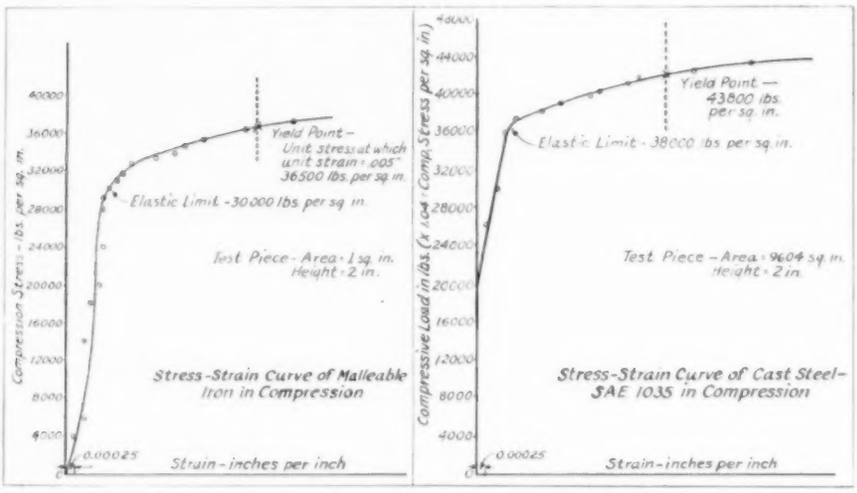
Ingersoll-Rand
11 Broadway, New York City

Makes Comparison Of Compressive Strengths

By L. J. Wise

In working up the design of a large casting which was to be made in malleable iron and also in cast steel, it was necessary to determine the resistance to compressive stress. Test pieces for both metals were cast from a pattern 1 x 1 x 2 inches and the subsequent results of the tests were plotted as shown in the accompanying charts. Analysis of the malleable iron in the test piece before annealing showed: Carbon 2.20 per cent, silicon 1.10 per cent, manganese 0.34 per cent, sulphur 0.09 per cent, phosphorus 0.16 per cent. Analysis of the cast steel test piece showed: Carbon 0.33 per cent, silicon 0.30 per cent, manganese 0.75 per cent, sulphur 0.04 per cent, phosphorus 0.035 per cent.


Compression Stress - lbs. per sq. in.
Yield Point — Unit stress at which unit strain = .005" 36500 lbs. per sq. in.
Elastic Limit - 30000 lbs. per sq. in.
Test Piece - Area = 1 sq. in. Height = 2 in.
Stress-Strain Curve of Malleable Iron in Compression
0.00025
Strain - inches per inch
Compressive Load in lbs. (x 1.04 = Comp. Stress per sq. in.)
Yield Point — 43800 lbs. per sq. in.
Elastic Limit - 38000 lbs. per sq. in.
Test Piece - Area = 9604 sq. in. Height = 2 in.
Stress-Strain Curve of Cast Steel - SAE 1035 in Compression
0.00025
Strain - inches per inch

Stress strain curve on two similar test pieces, one malleable iron at the left and the other cast steel at the right

Apprentices Are Trained in Navy Yard

Interesting highlights of its training course for young men have been issued by the Philadelphia Navy Yard Apprentice association, Philadelphia. Beginning with a historical survey of the development of this mode of teaching the shipbuilding trades, including reference to Joshua Humphreys, the first naval constructor for the United States, it presents information pertinent to improvement in apprentice training through the years.

Prior to the establishment of apprentice schools in the United States navy yards, the local night schools were relied upon to supply instruction required by the young shipyard workers. Due to the many special courses needed by the apprentices in the shipbuilding trades, the board conducting the semiannual examination of apprentices at the shipyards in Philadelphia in June, 1912, recommended that the "government follow the examples set by some of the large industrial corporations in providing means of education of apprentices." In August, 1912, the navy department authorized the establishment of these schools.

A basic requirement for the success of any training program is the proper selection of apprentices. In the navy yard this is well provided for. Apprentices in the mechanical trades are selected through open competitive examinations under the United States Civil Service commission. Under no circumstances may the number of apprentices exceed 20 per cent of the artisans employed in the trade; except upon specific authority of the navy department.

The normal length of apprenticeship in any of the trades is four years, examinations in shop and school subjects being held twice a year under the direction of the yard labor board. Skill in the trade is acquired by the young men through experience on actual productive jobs in the shops and shipyards. A continuous record of the progress of the individual in his training and his attitude toward his work is kept on a shop course form that accompanies him in transferring from one trade element to another. Supplementing the shop courses, apprentices receive instruction in related technical subjects in a school organized for the purpose within the navy yard plant.

Current records of the personnel offices in this yard indicate an enrollment of 137 apprentices, including 4 molders and 3 pattern makers.

Vanadium Corp. of America has moved its general offices to the Graybar building, 420 Lexington avenue, New York.

Illinois Founders Discuss South America

Frank M. White, president, Burd Piston Ring Co., Rockford, Ill., addressed the Northern Illinois Foundrymen's association at its regular meeting held March 10 at the Elks Club, Rockford. His subject was "Observations of Business Conditions in South America." H. S. Bennethum, Stover Mfg. & Engine Co., Freeport, Ill., president of the association, presided.

The first part of Mr. White's talk was devoted to an interesting and entertaining talk on the countries visited during his 15,000-mile trip, with a vivid description of his trip by air over the Andes mountains.

The business possibilities of the South American countries were discussed and the speaker stated that there is a scarcity of foundries. Most of the raw materials for the foundries has to be imported and the best local iron is machinery scrap. He stated that all molding is done on the floor in the foundries he visited, the molds in some cases containing as high as 12 different patterns.

Dry Sand Core Cuts Molding Cost

(*Concluded from page 49*)

in instances where the design of the casting permits no taper allowance. When the box is withdrawn from the core and swung over again to starting position, the wood block lining remains on the plate. The blocks then are drawn sideways and replaced in the box for the succeeding core.

Composite layout of the finished mold, shown in Fig. 4, illustrates the type of casting iron core arbor used when producing the castings by the second method, also the square wood drag mold frame employed in place of the steel flasks, which were released for more suitable work. The gating method was the same as that in the former instance. Four spray inlet gates at the wide end of the casting proved very satisfactory.

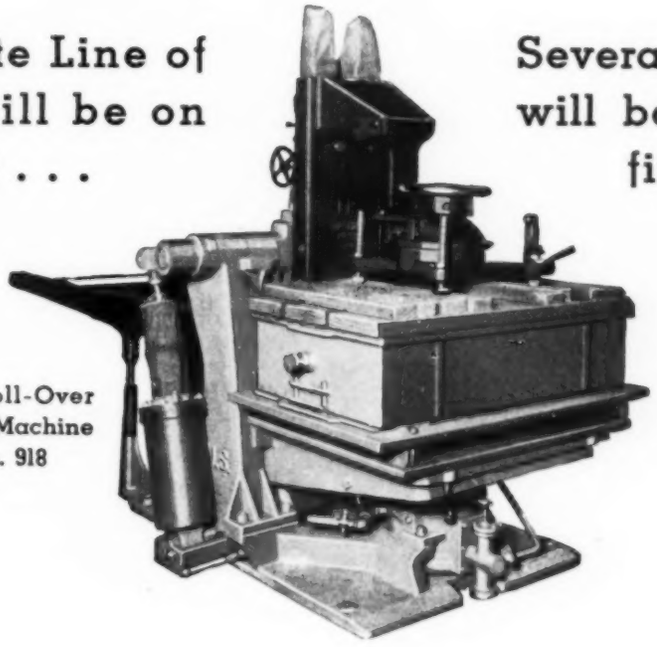
Improvements effected by the change included a reduction in time of 4 minutes per mold. Actual drag molding time averaged 5 minutes with 3 men. The cover cores were made by 2 men in 5 minutes each, a total of 10 minutes for the complete mold as against 14 minutes, and the reduction of the crew of men from 6 to 5. Substitution of simply made oil sand cores for complicated green sand copes reduced the average casting loss to 2 per cent. Cleaning costs were practically the same in both cases. Naturally the cope face was cleaner under the dry sand core.

MEET "U-S" AT DETROIT—MAY, 4 to 9

BOOTHS 501-502

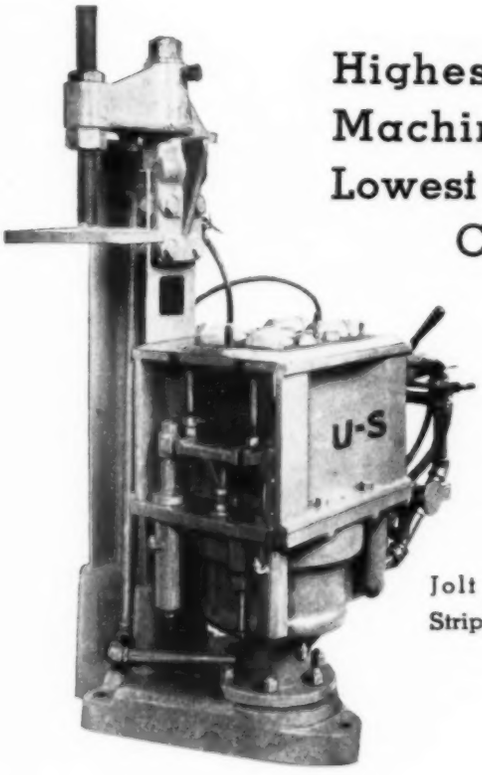
Our Complete Line of Machines will be on display . . .

Several New Machines will be shown for the first time . . .



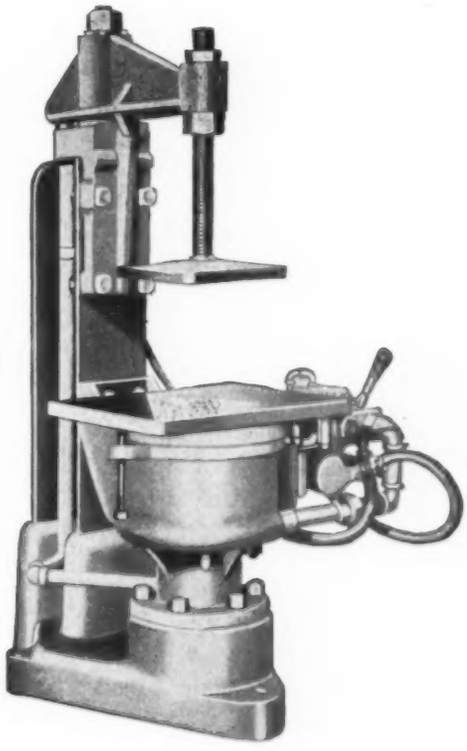
Jolt Roll-Over Draw Machine No. 918

Highest Production Machines with the Lowest Maintenance Cost . . .



Jolt Squeeze Stripping Plate

Jolt Squeezer



The **JOHNSTON and JENNINGS** *Company*

ADDISON ROAD and N. Y. C. TRACKS — CLEVELAND, OHIO

Reader's Comment

EDITOR'S NOTE—*Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of* THE FOUNDRY *or of Its Editors.*

Safety First

TO THE EDITORS:

May we call attention to the cover of your December 1935 issue. One of our foremen, who is a reader of your periodical, called our attention to the fact that the photograph of a molder pouring with a small ladle is correct excepting one glaring oversight. This man does not wear his pouring "leggins."

Our foreman thought that as *Safety First* is being hammered into each and every foundry employe, and as your magazine advocates safe practice, and carries advertisements covering safety devices, that you should not print a cover design which is seen by thousands of foundrymen, that does not show proper usage of safety appliances.

R. C. S. POTTER

Chemung Foundry Corp.,
Elmira, N. Y.

Is No Crackpot

TO THE EDITORS:

What is wrong with the jobbing foundries when you state 90 per cent are short of money. I have no cure all. Having worked for past 30 years in job foundries here are my findings. (Hope I am not a crackpot).

1. Lead pencil John owned a foundry. What does he do? Cut the price to break in. Next he cuts the molder. Listen, these are facts. When the NRA was operating how he shouted for F.D.R. Every foundry should support it to the letter. What did he do? Had the floor and bench molders come in at 4 a.m. in the morning and ring the time clock at 8 a.m. (12 hours a day). In plain words, he was a chiseler of the deepest dye. He was the man everyone was afraid of. Big Shot.

2. Times are tough in the job line. What do they do? Why it is simple, cut the help in that case. A molder worked 27 hours on a difficult job a little hard luck. Well, pay day he received $2.10. No one opening up. Took it on the chin, as they say today. I wish I could go on.

3. Listen to this one. I personally spend my own money running around looking for work in foundry. I worked for and got about 14 new accounts all my former customers in closed foundry. Covered 956 miles, spent $17.09, gone 4 days and was not even thanked. Believe it or not, I was found fault with.

The job foundries of today have as heads of the firms, managers that are too young. They will learn. The Supreme Court are not just boys, but I note their decisions are quite just. Having worked up from the sand pile why I regret to see the old, "Bull of Woods" pass away. He appreciated to the letter when we all worked for the interest of the shop. He knew us all and depended upon our judgment. And we stood by him. Today what is wrong, is you have no confidence in the owner and the man has none in you. Life is an echo, you get what you give.

Knowing well this is going to the waste basket, I at least as a jobber feel that the foundries are going to ruin when I am gone. I feel sorry to think us poor fellows who have spent our life now have to pass to some minor position or poor house unwanted by all foundries. Because we are not graduates of college and spent about 68 hours in freshman class (first semester) in the foundry course or some vocational school. Where will we go?

ANONYMOUS.

EDITOR'S NOTE—Will the author send his name and address?

The Comeback

TO THE EDITORS:

That opening editorial in the March issue of THE FOUNDRY is a *beaner* and it should make some of these foundry owners sit up and take notice.

I am personally going to see to it that each of the owners of this foundry read every word of it, and my advance opinion of their reactions will be NIL—in other words it wont get under their skin at all.

Now without going into any detail as to the setup here—ownership etc.—I, (a rank outsider) just cannot let your challenge pass unnoticed and without a come-back of some kind. It might be a punk effort but—here it is.

I came into this concern as office man in December, 1929—just in time to catch the depression head on, and what I knew about foundries or castings you could put in your eye and never feel it. Now I have knocked around a bit and know a little about business, and right from the start I noticed many, many things that were being done that looked like suicide to me.

Of course being a newcomer I had to feel my way—and what do you think my predecessor told me when I came? I'll repeat his exact words as nearly as I can remember them—"Now whatever you DO—DONT make ANY suggestions—that would kill you with them—let them have their own way and you will get along fine."

Well, Mr. Editor the only answer I have to that suggestion is THAT I DIDN'T follow it, and I have raked all of them over the coals whenever it looked like they needed it, and for the same things over and over again. The trouble is that there is NO PENALTY for their errors—they are the BOSSES, and I have told them that it would not be very healthy for them if I were the "big shot" around here—there would be plenty of penalties—and what's more they would be where they would feel them and hurt them—and that's in the pocketbook.

My chief concern was in cutting out expenses—useless ones—and stopping waste, etc., and if I do say so myself I have saved them the price of my salary every year that I have been here in one department alone.

Now this foundry has been here on the same spot for over 30 years—and if it is ever going to be a real place of business, it looked to me that it was time to start something. I tried to talk these things over with them, but did not get much encouragement—it was over their heads. They did admit that they had the facilities and all for handling more business—to expand—increase sales, etc., BUT could only see one way and that was to find a specialty to make for someone else that would give them production. They tried it several times to their sorrow—put all their eggs in one basket—and the basket caved in. All the time I was trying to sell them on an idea that right under their noses was a market that they were not touching, and they could at least try it out at little expense—and all the eggs would almost have a separate basket for each egg, and after six years of trying have finally got them to see it my way. It just CAN'T FAIL. (More about it later—PERHAPS).

I did get them to consent to a little publicity in the shape of a monthly bulletin—we ran it two years, and when it was up for consideration I said—"Now there are three of you—and one of me—that's four—and there are to be twelve issues of this thing—will each of you write three of them, and I will write three and that will make the twelve." That was fine, and they all agreed to it, and then I kept after them until I was tired for their copy and the printer was yelling for it—SO-O-O-O-O, well I just had to write all of them myself—and me NO FOUNDRYMAN. Well we sent out 200 of them each month for a year and then renewed it for another year—and I had to write the second twelve.

I never overlook an opportunity to try and sell this foundry as a good institution—to heck with the fellows that run it—the buyers don't care anything about them. What the buyers want is good castings and from a

(Concluded on page 116)

Cleaning Castings Cheaply
Is A Vital Problem

Often it's the difference between profit and loss

"CLEANING CASTINGS CHEAPLY" is the life work of J. S. McCormick Co. whose Facings and Core Binders eliminate a BIG part of Cleaning Room Costs.

Our products are identified by the Keystone on the label

The big Neon Keystone will identify our booth at the Detroit Convention — you can see it as you step into the main doorway — there you'll meet the men who know all about CLEANING CASTINGS CHEAPLY.

J. S. McCORMICK CO.

Pittsburgh, Pa.

Significant—
is the *rising tide* of STEEL ABRASIVES

Significant is the fact that more industrial plants have changed from sand to steel abrasives in their cleaning departments during the past two years than in any previous two-year period!

Significant also is the fact that all of the major developments in new blast-cleaning equipment during the past three years have been primarily designed to employ the use of steel abrasives,—steel shot and steel grit.

Significant, too, is the growing preference for steel abrasives because they reduce the hazards created by excessive, harmful dust in the cleaning operation.

If you operate blast-cleaning equipment, you cannot afford to disregard longer this rapid, replacement of natural sand with steel abrasives for most blast-cleaning operations. Steel abrasives have cut cleaning costs and speeded production for hundreds of others; they can do the same for you.

A single ton of Globe shot or grit will clean as many castings as a carload of sand—will cut your cleaning costs 25% to 50%. Interesting figures on actual operating costs are yours for the asking.

See our Exhibit at the American Foundrymen's Association Convention. DETROIT May 4-9 Booth No. 199

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

GLOBE

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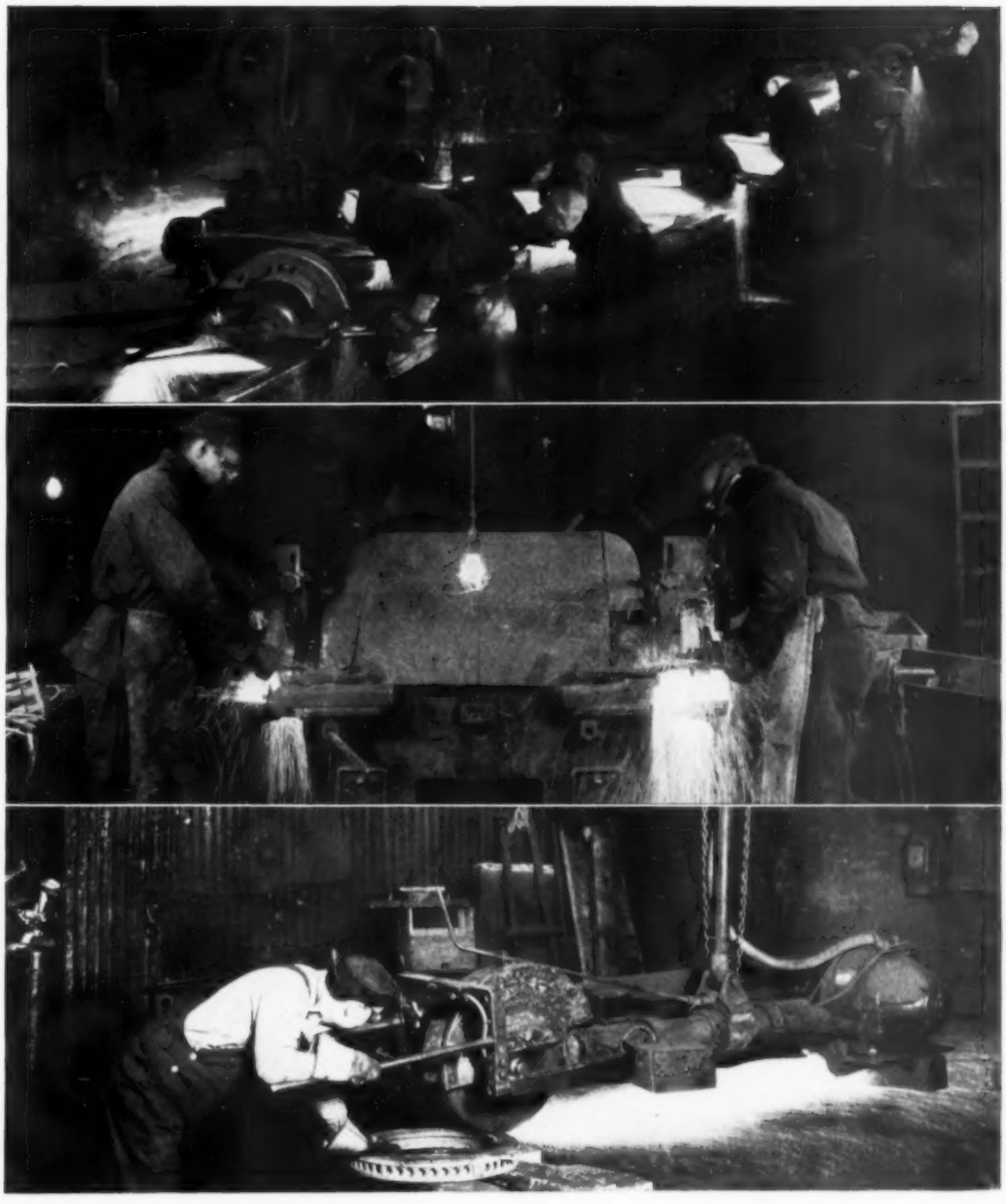


Macklin Grinding Wheels are widely and efficiently used on all types of foundry jobs. When floor stands and swing frame grinders are Macklin equipped production runs smoothly and economically as Macklin wheels cut fast and easily. Let Macklin Protect your Production.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.

Sales Offices:—Chicago—New York—Detroit—Pittsburgh—Cleveland—Cincinnati—Milwaukee—Philadelphia

(*Concluded from page* 112)

reliable source of supply—names don't mean so much to them.

I read up on everything I could find on the foundry business and studied how to handle customers over the phone—that's where most of our business comes from—phone calls—and in order to leave them feeling like their orders were going to be put through right and handled right I have made it a practice to end up with—"O.K. I UNDERSTAND IT."

I could be just a common ordinary garden variety of record keeper—but that doesn't suit me. I have an inquisitive streak in me, and like to know "why" and "how" and have taken on plenty of work (that I could avoid) to get at what I want to know. I keep all the records of the foundry, machine shop, laboratory, pay rolls for all of them; cost figures for all of them, all the billing, all the finances, run a trunk line switchboard with extensions, keep a lot of their personal affairs, make all reports, income tax, corporation tax—Oh heck—there are plenty of them—why ennumerate?

I said to one of the owners one day—the treasurer—"Say did you ever go into one of the country cross-roads general stores? Well if you did and asked the owner to show you one of his letterheads—when you looked at it you would see one exactly like you are using, and its not so hot for a first class foundry."

So I went ahead without asking and got up the one this is written on. It's not the best in the world—but a darn sight better than what they had—and the same is true of the checks we use—and quotation sheets—well they just didn't have any.

And now here is one for you—after reading all of this junk just close your eyes and try and form a mental picture of me and then when you write tell me how I look—

Long or Short
Thick or Thin
Light or Dark
Old or Young

and if you come anywhere near the original or have any curiosity to know anything more about him I'll answer any questions on request.

And above all I don't want to be cheated out of knowing the results that come from your article—and will say again IT WAS A BEANER.

NAME-ON-REQUEST.

Book Review

A.S.T.M. Tentative Standards, 1935 edition, 1500 pages, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, and supplied by THE FOUNDRY, Cleveland, for $8.00 plus 15 cents postage for the cloth binding and $7.00 plus 15 cents postage for paper binding.

This annual publication of the A.S.T.M. is the only volume containing all of the society's tentative specifications, methods of testing and definitions of terms, engineering materials and the allied testing field. These tentative standards embodying the latest thoughts and practices are used widely throughout the industry.

The 1935 edition contains 290 tentative standards. Of these 75 are included for the first time while some 65 were revised in 1935 and are given in their latest form. The specifications include 48 for ferrous metals, 32 for nonferrous metals, and 22 for miscellaneous materials.

New tentative specifications published for the first time cover the following ferrous and nonferrous materials: Seamless steel still tubes for refinery service; heat treated carbon steel and alloy steel track bolts; seamless steel heat exchanger and condenser tubes; steel pipe flanges for general service; carbon steel and alloy steel castings for railroads; steel castings for miscellaneous uses, uncoated and zinc-coated wrought iron sheets; electrodeposited coatings on steel, several types of chromium and chromium-nickel steel castings and sheets; lead coated sheet copper, lead and tin-base alloy die castings and phosphor-bronze plates for bridges and structures. Three new methods of spectrochemical analysis of various nonferrous metals also are given.

British Institute Holds London Meeting

The twenty-eighth annual general meeting of the British Institute of Metals was held in London, England, March 11 and 12, with Dr. H. Moore presiding. He welcomed a number of foreign members attending the meeting, and referred to arrangements with the Iron and Steel institute, which will enable the two organizations to work in closer co-operation without in any way interfering with their respective functions.

Results of the election of officers for the year 1936-37 were announced as follows: W. R. Barclay, president; Dr. H. W. Brownsdon, Prof. D. Hanson, and E. L. Morcom, vice presidents; and Dr. S. F. Dorey, K. Gray, J. H. M. Greenly, D. C. Macnaughtan, C. J. Smithells, and F. Tomlinson, members of the council.

The presidential address, on "The Development Movement in Nonferrous Metallurgical Industry," described the working of the international organizations to stimulate research and intensify the use of certain metals, such as nickel, aluminum, tin, and copper.

The Institute held a special meeting in London, March 10, in connection with its annual general meeting, to discuss the subject of "Metallic Wear." The discussion was opened by Dr. H. W. Brownsdon.

Stresses Need of Better Salesmanship

Emphasizing the fundamental importance of cast products to the production of all machinery and tools of civilization, J. H. Redhead, president, Lake City Malleable Co., Cleveland, addressed the Detroit chapter of the American Foundrymen's association at the Fort Shelby hotel, March 19, stressing the need for better salesmanship.

At a meeting attended by more than 80 foundry executives, Mr. Redhead illustrated by contrast sales methods employed to distribute consumer commodities, such as hats and cosmetics, with the total lack of sales ability applied to castings distribution. He pointed out that metals and fuel constitute but a small portion of the cost of castings while labor, brains, art and skill are the important component parts.

Foundrymen must make enough in three prosperous years to carry over a succeeding 5 years slow business. It is necessary to work in order to sell. The salesman should find all of the things that must be right to produce castings which are satisfactory and serviceable. The speaker advised a closer study of customer requirements and an insistence upon full and complete information before endeavoring to sell the castings. Better salesmen are needed in the foundry industry. These should be trained carefully, and the highest type of men should be sought.

Vaughan Reid, City Pattern Works, chairman of the Detroit chapter, presided with Frank Mushynski serving as temporary secretary. Lee Barrett, Detroit Convention and Tourist bureau, C. E. Hoyt, executive secretary, and Dan M. Avey, president of the American Foundrymen's association, spoke briefly on the coming Detroit convention and exhibition.

Practical Working List for Reference

"Bibliography on Foreman Improvement" is the title of the recently published list of references, including books, pamphlets, and magazine articles, issued by the federal board for vocational education. Its purpose is to make available to those responsible for educational work with foremen and other executives in industry, a practical working reference list of such of this material as is concerned directly with the types of foreman training which are being promoted in connection with state programs of trade and industrial education. The pamphlet may be obtained from the superintendent of documents, Washington, for 5 cents.

DUST is an undercover spendthrift

One of the great advances of industry is the recent realization of just how uncontrolled dust has chiseled into profits.

Blaw-Knox Dust Control increases profits just as surely as modern production machinery reduces costs. A Blaw-Knox Dust Collector installation applies the results of scientific research and highly specialized engineering to your problem for the suppression—collection—removal of dust of any character.

If your dust problem is large or small—hot or cold—dry or wet—consult Blaw-Knox for prompt and economical solution.

BLAW-KNOX COMPANY
2097 Farmers Bank Bldg. Pittsburgh, Pa.

BLAW-KNOX
DUST CONTROL SYSTEMS FOR INDUSTRY

New Foundry Unit Opened in Detroit

Detroit Gray Iron Foundry Co., Detroit, opened a new electric furnace unit on March 14 for the manufacture of Lektrokast, the new electric furnace cast iron. Approximately 3000 friends and customers attended the formal opening.

The large, modern unit is housed in a new building with approximately 15,000 square feet of floor space in which extensive equipment additions have been made. Hugh Martin is president of the company.

Left to right—Herman Kluender, vice president, Detroit Alloy Steel Co.; Howard Colby, chairman of the board, Detroit Alloy Steel Co. and Detroit Gray Iron Foundry Co.; and Hugh Martin, president, Detroit Gray Iron Foundry Co.

Sees Legislation As Increasing Costs

The federal social security act and its significance to employers and employes was discussed at a meeting of the New Jersey Foundrymen's association in Newark, N. J., March 11. The principal speaker was Thomas B. Shearer, editor, Prentice-Hall Labor and Unemployment Insurance Service, New York. He warned against contracting to deliver at present prices over long periods ahead, saying that the effect of the social security taxes would be to increase costs in manufacture of all materials and parts. He cited some estimates of the extent of these increases. At the maximum rates, he said, the cost of manufacturing automobiles would be increased $7 to $22 per car, depending on the make. The cost of telephone service would be increased $3 per telephone per year. The costs of public utilities would be increased all the way from 20 to 80 per cent. He cited a large electrical manufacturing company as estimating that, on the basis of the maximum rates, its costs would be increased by about 46 per cent of its present net income.

However, he said, his investigations have shown conclusively that majority sentiment in the United States favors social security in principle, so that the only question to be raised at this time is whether or not the existing social security act is satisfactory as it stands. He discussed the principal features of the act and declared that the more he studies this entire situation, the less positive are his opinions about the act.

Arthur M. Torrey, secretary, Employers' Association of New Jersey, Newark, analyzed the principal features of New Jersey's proposed social security law. He also discussed other legislation which is pending in New Jersey which has a bearing on manufacturers.

H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., reported a proposed apprenticeship policy which, after a number of controversial points have been ironed out, will be submitted to the association for approval.

The Adventures Of Bill

(*Concluded from page* 74)

"I did not own a bicycle, but I had learned to ride. Therefore I was highly gratified when after dinner Archie proposed a spin on the tandem. Since that time I have covered considerable territory in various modes of conveyance, but only rarely have I had a more pleasant jaunt. With coat tails streaming in the breeze we sailed along at top speed. No cops or traffic lights and although we had no speedometer I imagine that at times we hit 'er up to close to 15 miles per hour. We rode around the grand boulevard, which at that time was almost on the outskirts of the city and then as a final gesture of recklessness we rode out Woodward avenue and past the great open spaces beyond to the Log Cabin. You can take a street car now in the heart of the city and ride out there in half an hour, but on that far away occasion I had all the sensations of an explorer setting out for an unknown territory in the upper peninsula of Michigan."

"I am to understand, then that you did not remain at the Log Cabin?"

"Remain there? Certainly not. We looked at all the relics and curiosities and then rode back to Archie's place. Why the silly question?"

"Assuming that you were wearing one of your pet suits, I thought perhaps Archie had taken you out to the Log Cabin with the deliberate intention of leaving you there as a permanent exhibit."

Book Review

The Next Hundred Years, by C. C. Furnas, cloth, 434 pages, published by Reynal and Hitchcock, New York, and supplied by THE FOUNDRY, Cleveland, for $3.00 plus 15 cents postage and in Europe by the Penton Publishing Co. Ltd., London.

Professor Furnas found at the Chicago Century of Progress great popular interest in various isolated phases of scientific development, but found many places at the Fair where the progress of science had not been applied. Therefore the great majority of visitors came away with a lack of understanding of the real accomplishments along scientific lines.

The subtitle of the book, "The Unfinished Business of Science" gives a better idea of the aim of the author in his presentation. The various sections are devoted to biology, chemistry, physics, engineering, and social consequences. Each of these branches is examined critically by a young man, trained in chemistry and engineering and now associate professor of chemical engineering at Yale university.

The author's description of the greatest chemical factory today is interesting. He sees the use of sunlight as a source of energy to convert carbon dioxide and water into foods by means of growing plants as this great factory. In discussing engineering, he points out that "There is no department of our mass life that is not eligible, waiting, really screaming, for improvement. We need safer airplanes and faster ones, automobiles and clothes that do not wear out, homes that are convenient, beautiful, sanitary and desirable, medicines that cure, schools that educate, and foods that do not cause indigestion. But above all, we need a social and economic system that is not out of tune; one that offers peace, security and a chance to work for the desirable worldly goods."

NORTON ABRASIVES

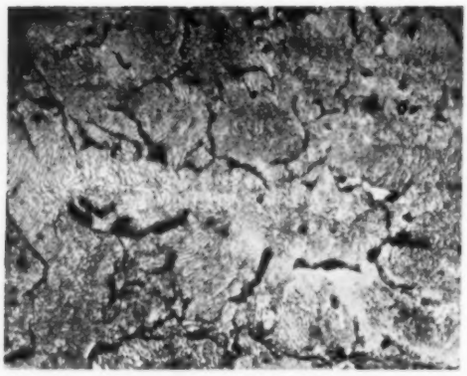
In the Foundry...

VISIT Norton Spaces 33 and 35 in the Foundry Show, Detroit, May 4 to 9.

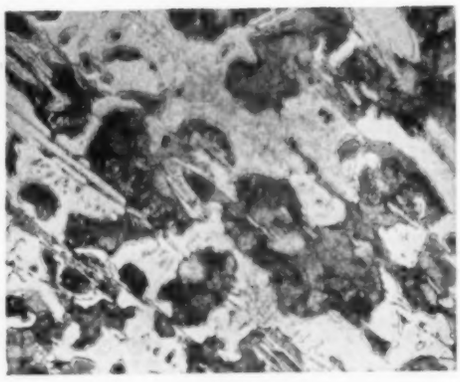
If you're snagging steel or soft malleable iron, you'll be interested in the Alundum and 15 Alundum Wheels—or in the Crystolon Wheels if you make castings of gray iron, hard malleable iron, brass or aluminum. You can see the regular vitrified and special B bond wheels for slow speed grinders, and the resinoid bonded wheels for high speed operation. There will be large wheels for floor stands and swing frames as well as small wheels for portable grinders. And of course there'll be Norton engineers on hand—men who specialize in foundry work and can give real help on your problems.

NORBIDE NOZZLES will be on exhibit, too—a large variety of sizes and shapes for all types of pressure blasting equipment. You can see why these nozzles with their lining of Norton Boron Carbide—the hardest material ever made by man for commercial use—can cut cleaning costs, because of their exceptional life, their decreased air consumption and their improved stream contour and velocity.

Norton Company
Worcester, Mass.



The Correct Microstructure for Particular Service Requirements is Consistently Obtained with



GLOBE SILVERY IRONS

IN THE CUPOLA CHARGE

AUTOMOTIVE
AGRICULTURE
RAILROADS
CHEMICAL
MACHINE TOOL
ELECTRICAL
STOVE
FURNACE

Progressive foundries making castings for these and other important industries are using Globe Silvery Iron in their cupola mixes.

We will be glad to assist you in designing a mix for castings that must meet particular service requirements.

GLOBE IRON COMPANY

JACKSON, OHIO

"Since 1872"

Speed Wheels that Cut

more cubic inches per minute

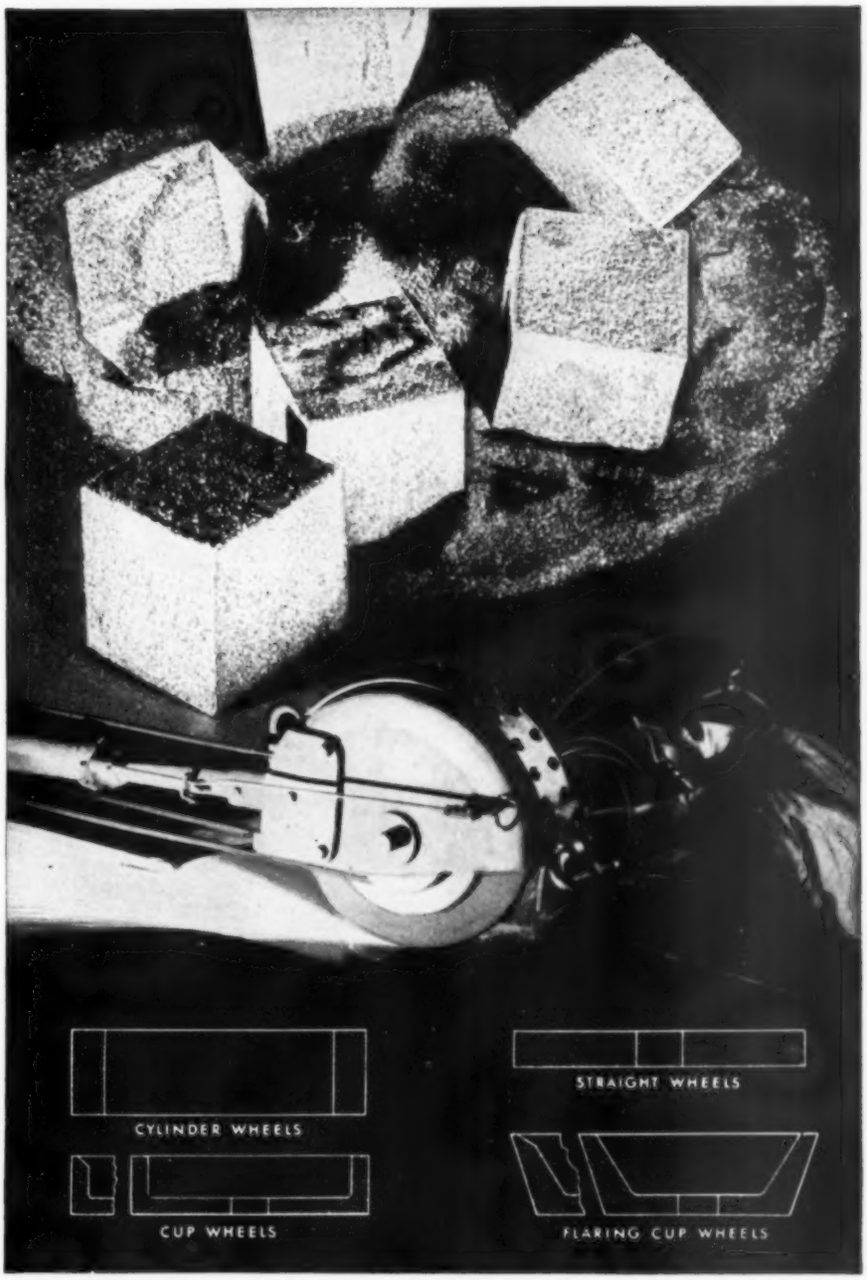
THE TIME is past when manufacturers could afford to judge the value of abrasive wheels by guesswork. That the introduction of high-speed operation into many types of grinding has set new standards of performance can be accurately measured by the *cubic inches of metal removed per hour or day.*

Affording both new dependability and increased wheel life at high speeds, abrasive wheels bonded with Bakelite Resinoid are, in many instances, reducing grinding costs one-third to one-half by removing more metal per minute. Bakelite Bonded snagging wheels run safely and continuously at 9,500 s.f.p.m., cut-off wheels up to 16,000 s.f.p.m.

Important characteristics of Bakelite Bonded wheels that have made these accelerated speeds practical are: great tensile strength to resist chipping and breakage; open, porous structure that insures cool operation; high uniformity of grade and structure; and heat resistance that prevents softening or gumming of the bond.

The leading abrasive wheel manufacturers★ now supply high-speed, high-performance Bakelite Bonded wheels in practically every type or size required. Consult them about the advantages of speed-grinding. Also write us for helpful booklet 15G, "High Speed Abrasive Wheels".

★The trade mark "REDMANOL" is also used to indicate abrasive products bonded with our resinoids.



BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.
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BAKELITE

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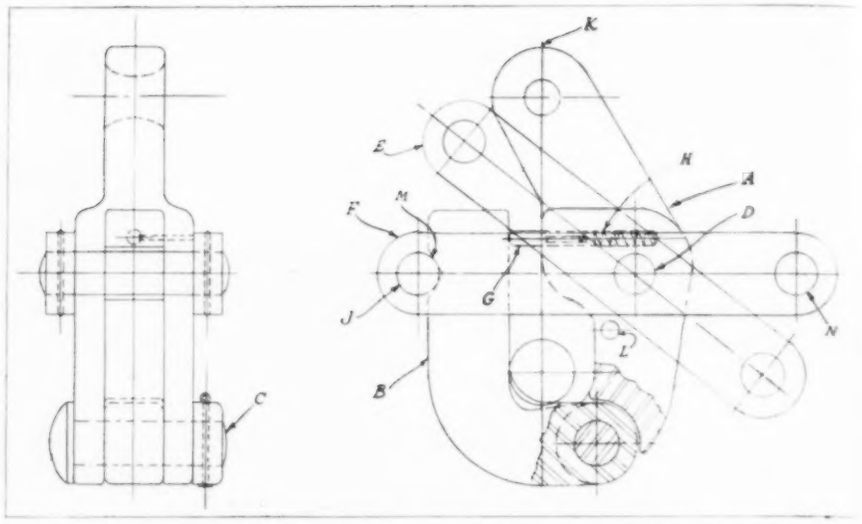
BONDED WHEELS

FOR ECONOMICAL HIGH SPEED GRINDING

Catch on Crane Hook Promotes Safety

By John A. Honegger

The safety type crane hook, shown in the accompanying illustration, has been developed to prevent accidents which sometimes occur through the chain or sling slipping through the opening in the usual type hook. It is made up of three main parts, the forging *A*, the movable link *B* and the latch *E*. The link *B* is hinged through the pin *C*. The locking latch *E* is pivoted at *D* and is shown in the normal or locked position at *F*. In this position the pin *G* and the spring *H* tend to press the link *B* against the pin *J*. This pin acts as a safety pin against any high frequency oscillations set up in the hook, which would cause the link *B* to wabble. The suspended weight tends to hang about the center line *K*, thus forcing the link *B* against the pin *J* with a force equal to the suspended weight plus the leverage of the arm. Stop pin *L* prevents the latch lock *E* from dropping too far out of position, thus causing the pin to fall out of the notch *M*. The latch may be released by pulling on a rope attached to the end *N*.



A pivoted latch opens and closes the crane hook

Manager, Former Apprentice, Signs Award

A ceremony which marked an epoch in two lives occurred recently in the office of T. J. Connor, vice president in charge of manufacturing, Caterpillar Tractor Co., Peoria, Ill. The signing of a company apprentice school certificate was the high spot in a story beginning in 1913. In that year James Munroe received his certificate of graduation from the Caterpillar company school of apprenticeship. Today he is factory manager of the tractor division, and this recent ceremony marks the signing of his first graduation certificate since his promotion. Alvie C. Rice is the young man who received it after four years of study in the Caterpillar classrooms and factory.

James Monroe signing Caterpillar apprentice graduation certificate for Alvie C. Rice

Presents Historic Facts on Cast Iron Pipe

To demonstrate the durability, low maintenance and high resistance to corrosion of cast iron the Stanton Ironworks Co. Ltd., near Nottingham, England has published in "Cast Iron Pipe: Its Life and Service" data concerning pipes which have proved their serviceability in the United States, France and Great Britain. Included in this 118 page book are historic facts on water supply, early uses of iron, development in the iron industry, and cast-iron pipe manufacture.

The Stanton Ironworks Co. Ltd. was the first to erect in England a plant for quantity production of deLavaud type centrifugal pipe. The company also manufactures the self-adjusting joint so necessary where subsoil movement results from heavy traffic vibration.

Plates include the comparative structure of a Roman and a modern nail; early lead, pottery and wooden pipes; sand-casting in a pipe pit; centrifugal casting; pipes with a long service record; and a tinted frontispiece showing "cast iron mains being laid in Piccadilly one hundred years ago."

Detroit Leads In Tonnage Produced

(*Concluded from page 42*)

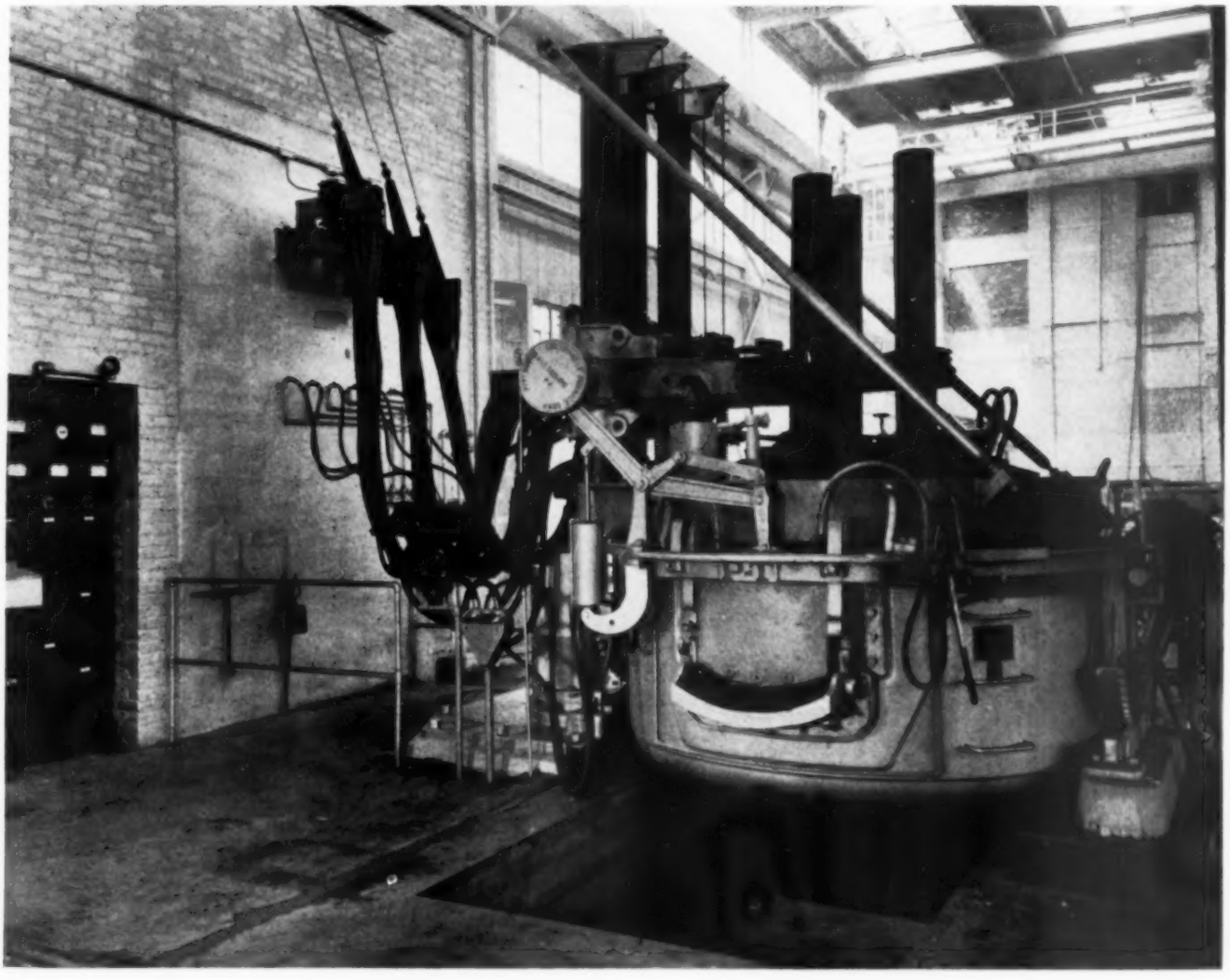
group plant visits on Monday, May 4, should prove of exceptional interest and value to all expecting to attend the convention. The trips will start from the Book-Cadillac and Statler hotels at 10 o'clock Monday morning, one going to the Ford Motor Co. and the other to the Great Lakes Steel Co. Either of these trips will be well worth an early arrival at Detroit.

In addition, the committee has arranged for a number of interesting plants in Detroit, Flint, Saginaw and Vassar to be open to visitors at certain times during convention week. Full information on that phase of the visitation program may be obtained at the registration booth in convention hall.

Makes Large Casting

What is believed to be the largest steel casting ever produced west of Pittsburgh was poured recently at the plant of the Hubbard Steel Foundry division, Continental Roll & Steel Foundry Co., East Chicago, Ind. The casting, weighing 160,000 pounds, is a rolling mill housing and is one of six to be built by this company for an installation in the Chicago district.

LECTROMELT . . .



A Top Charge Type, 3 Tons Per Hour Capacity, Lectromelt Gray Iron Furnace Just Installed

TOP CHARGE TYPE
DIRECT ARC MELTING FURNACES

VISIT OUR BOOTH AT THE FOUNDRY CONVENTION IN DETROIT
MAY 5th TO MAY 9th

PITTSBURGH LECTROMELT FURNACE CORP.

P. O. BOX 1257 PITTSBURGH, PA.

Cupola Practice Discussed In St. Louis

D. J. Reese, Whiting Corp., Harvey, Ill., spoke on "Cupola Practice" at the March 12 meeting of the St. Louis Chapter of the American Foundrymen's association.

Mr. Reese explained the method of selecting the size of cupolas for various foundries, the right amount of air to use, and the proper construction of the sand bed. He went into considerable detail regarding air leakage, methods of lighting cupolas, depth of coke beds, and the proper method of charging to achieve the most satisfactory results. His talk was illustrated with slides.

Book Review

The Technology of Woodworking and Metalworking, by Norman R. Rogers, cloth, 337 pages, published by Pitman Publishing Corp., New York and supplied by THE FOUNDRY, Cleveland, for $3.00 plus 15 cents postage.

This book is intended primarily for students in the subject of handcraft and covers the materials, equipment and practices followed in woodworking and metalworking by hand.

The woodworking section takes up the various points which must be observed in the selection and handling of timber; and discusses the chisel, the plane, the maintenance of cutting edges, the saw, care of the saw, boring tools, miscellaneous tools, holding tools, testing and marking tools, construction processes, nails and glue, decorative processes and the finishing of wood surfaces.

The metalworking section deals with materials, holding, measuring and marking tools, bench tools, drills and drilling, screws, sheet metal work, forge work, molding and casting, construction and decorative work in copper, and machines.

Submits Revised Scrap Classification

The standing committee in charge of simplified practice recommendation No. R58-28, has submitted a revision of the recommendation on the classification of iron and steel scrap. The bureau of standards, Washington, has mailed copies to all interests for consideration and approval. The original recommendation was approved at a general conference of the industry held in 1926. The first revision became effective Jan. 1, 1928.

The recommendation specifies classes of scrap for blast, basic open hearth, acid open hearth, and electric furnaces, for gray iron foundry practice, Bessemer converters, and for miscellaneous scrap. The current revision covers additions and eliminations to meet current needs.

Copies of the proposed revision, in mimeographed form, may be obtained from the division of simplified practice, bureau of standards, Washington.

Publishes Report Of Bureau of Mines

The annual report of the bureau of mines to the secretary of the interior recently has been published. This is a summary of the activities and administrative functions of the bureau, and comprises four branches as follows: Technologic, which covers a broad field of research on problems affecting the mining, metallurgical and petroleum industries; economics, which compiles and issues data on various economic problems, including statistics on the production and value of minerals; health and safety covering the study of methods conducive to the reduction of hazards to workers in the mineral industries; and the administrative branch which handles routine administrative matters, such as personnel, clerical assignment, and multigraphing, and is responsible for the editing and distribution of publications and motion-picture films.

Consumption Of Molding Sand Increasing

According to recent detailed statistics published by the bureau of mines, United States department of the interior, Washington, there were 3,336,855 short tons of molding sand used commercially in 1930, having a total value of $3,547,154, and an average value of $1.06 per short ton. In 1931 the total number of tons decreased to 2,138,305, with a total value of $2,122,049, and an average value of 99 cents. Showing a further decrease in 1932, the total of short tons was 1,118,146, with a total value of $1,051,702, and an average value of 94 cents. In the year 1933 the total began to climb, equaling 1,718,251 short tons, having a total value of $1,558,738 and an average value of 91 cents. According to 1934 figures, the total had reached 2,167,731 short tons, a total value of $2,169,254, and an average value of $1.

Clarke-Harrison Inc. has opened an office in suite 1818, Packard building, Philadelphia. The services of this company include general management, engineering, sales, organization and operating methods, budgetary control, accounting practice, production control, and product, plant and manufacturing studies.

Foundrymen Consider Problems of Personnel

Glenn Gardiner, Forstman Woolen Co., Passaic, N. J., and vice president of the American Management association, presented an interesting picture of the industrial conditions and relations throughout the country at the January meeting of the Quad-City chapter of the American Foundrymen's association, held at the Fort Armstrong hotel, Rock Island, Ill.

Mr. Gardiner said that the problem confronted by industry is one of rebuilding its organization. This must be done by giving consideration to the rank and file of employes through proper training and by some method that will give us a sufficient supply of skilled help and workers. He spoke of the need of apprentices and their place in filling existing vacancies.

The speaker also referred to the rebuilding of the supervisory force or foremen, emphasizing the fact that they needed to have practical and technical ideas, and be able to appreciate the organization for which they work. Foremen should be able to see the managerial point of view of running a business so as to bring the company policies to the workmen. The speaker brought out the idea that human problems should be as important as the problem of production and sales.

The meeting, attended by 125 men, was opened by A. E. Hageboeck, president of Frank Foundries Corp., Moline, Ill. F. W. Kirby, John Deere Spreader Works, East Moline, Ill., introduced the speaker.

Gray Iron Society Will Meet In Detroit

The Gray Iron Founders' society will hold its annual meeting in Detroit, May 5, during the convention of the American Foundrymen's association. Headquarters of the Society will be at Hotel Statler, with W. W. Rose, executive vice president, in charge.

To Handle Grinders

Hutton H. Haley and Associates, 2832 East Grand boulevard, Detroit, have been appointed agents in the Detroit territory for the sale of heavy duty grinders manufactured by Kling Bros. Engineering Works, Chicago, and distributed by the Bryant Machinery & Engineering Co., Chicago. The grinders produced by the Kling company are designed especially for snagging operations and heavy duty grinding.

"CERTIFIED"

Steel Abrasives

Keenest Cutting Qualities

"CERTIFIED" STEEL ABRASIVES will shave your blast cleaning costs to a minimum. They are made from the highest quality of raw materials obtainable, and especially heat treated to make them tough, hard, and impervious to shattering. They greatly decrease Dust . . . add longer life to your Nozzles . . . and may be used over and over again.

ONE BAG of "CERTIFIED" Steel Grit (sharp for cutting), or Steel Shot (round for pein-hammer effects), will do the work of a TRUCK LOAD of SAND.

VISIT OUR BOOTH AT THE FOUNDRY SHOW.

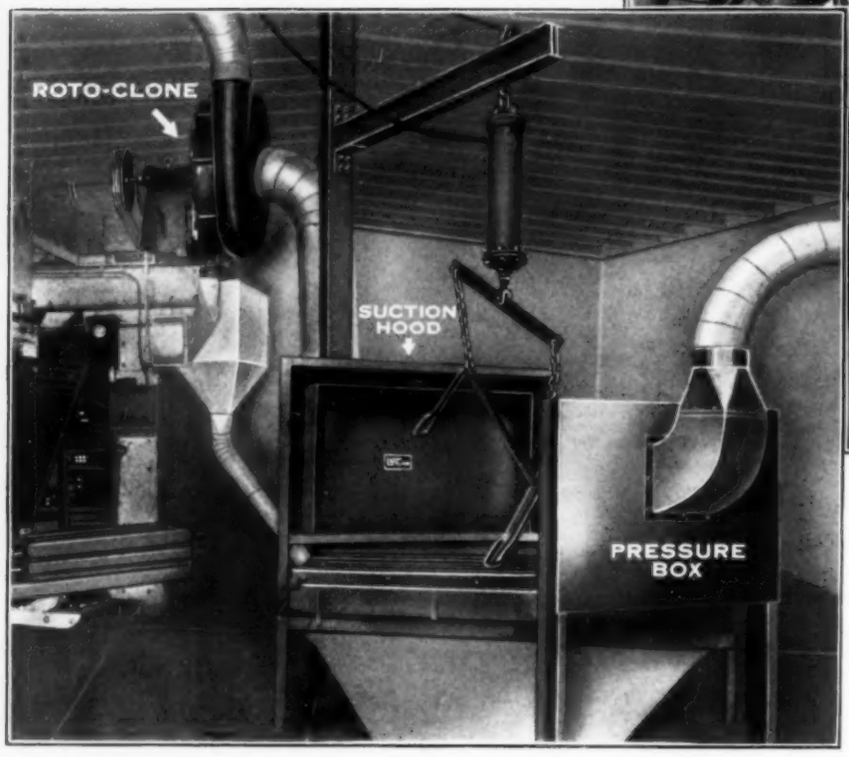
PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PENNA.

STEEL SHOT AND GRIT CO.
BOSTON, MASS.

ROTO-CLONE

Combined Exhauster and Dust Separator

in FOUNDRY *Dust Control*



Above—Grinders equipped with a Roto-Clone exhaust system.

Left—Shakeout dust control with AIR CURTAIN SYSTEM equipped with Roto-Clone.

The above pictures show two major applications of Roto-Clone in foundry practice.

Because practically every foundry operation creates dust and presents an individual dust problem, the American Air Filter Co. has developed special dust control equipment involving a minimum of expense and rearrangement of equipment. Complete information is now available. Write for bulletin "Foundry Dust Problems." There is no obligation, of course.

American Air Filter equipment will be on exhibit and demonstration at the Foundry & Allied Industries Exposition, Spaces 416-418 at Detroit, May 4th to 9th. Be sure to visit our display.

AMERICAN AIR FILTER CO., INC.
Incorporated

70 Central Avenue Louisville, Kentucky

In Canada—Darling Brothers, Limited—Montreal, P. Q.

AMERICAN AIR FILTERS

Obituary

WILLIAM J. GILMORE, 54, vice president, Ohio Steel Foundry Co., Lima, O., died at his home in Lima on March 1. Mr. Gilmore was born and spent his youth in Oil City, Pa., where he learned the molders trade. After working in various iron and steel foundries in that district he went to the Chicago district and became superintendent of the Indiana Harbor plant of the American Steel Foundries. Later he became vice president of the Hubbard Steel Foundry Co. and for a time also was connected with the Allied Steel Casting Co., Harvey, Ill.

In 1922 Mr. Gilmore became associated with the Ohio Steel Foundry Co. as works manager of the Lima plant. He became vice president in 1926 and in that capacity had charge of the operations of both the Lima and Springfield plants. He was well known throughout the steel castings industry and had an extensive understanding of steel foundry practice and keen ability to apply it.

♦ ♦ ♦

Kenneth Ruland, 21, connected with the Ohio Steel Foundry Co., Lima, O., died March 13.

♦ ♦ ♦

Ceylond E. Williams, 80, former molder for the Humphrey & Sons Co., Joliet, Ill., died March 3, at Minooka, Ill.

♦ ♦ ♦

E. T. Conner, 68, affiliated in a sales capacity for the past 26 years with Reliance Steel Casting Co., Pittsburgh, died at Pittsburgh recently.

♦ ♦ ♦

Karl Dodge, 44, for several years associated with the Link-Belt Co., Chicago, and a son of the late John Mapes Dodge, a founder of the company, died in Philadelphia, March 22.

♦ ♦ ♦

James F. Campbell, 55, president of Antaciron Inc., Wellsville, N. Y., died recently in Wellsville. He perfected a process for the manufacture of acid resistant iron.

♦ ♦ ♦

Alexander I. Aitchison, 52, employment manager of Dominion Foundries & Steel Ltd., Hamilton, Ont., died recently. He had been a major executive of the company for the past 25 years.

♦ ♦ ♦

William Henry Reeby, president until his retirement in 1921, of Reeby Foundry Co., Chicago, died March 1 at his home in Oak Park, Ill. Previous to the organization of the foundry company, Mr. Reeby was president of the W. J. Reeby Elevator Co., which was merged with the Otis Elevator Co. a number of years ago.

♦ ♦ ♦

Clarence J. Olmstead, 66, formerly assistant to the president of the Westinghouse Air Brake Co., Wilmerding, Pa., died at Miami, Fla., March 23. He retired 5 years ago and recently has been making his home in Florida.

♦ ♦ ♦

Henry P. Biegel, 69, superintendent of foundries at the main works of Allis-Chalmers Mfg. Co., Milwaukee, died in Milwaukee March 29. He entered the works in 1896 and was promoted to superintendent in 1916.

Henry P. Biegel

♦ ♦ ♦

Albert Willerth, 82, former owner of Jefferson Brass Foundry, Brooklyn, N. Y., died recently in Laurelton, N. Y. Born in Oderan, Austria, Mr. Willerth came to this country at the age of 27, and after a short time in the lumber business, began his career as a foundryman.

♦ ♦ ♦

Arthur Knight, 65, died recently in Winnipeg, Manitoba, Canada. He was formerly connected with the American Shipbuilding Co., Cleveland, and went to Canada approximately 30 years ago. He was identified with the Manitoba Bridge & Iron Works Ltd., Canadian National Railways and was works manager of the Manitoba Steel Foundries Ltd. when he retired in 1928 owing to ill health. Mr. Knight was a member of the American Foundrymen's association for many years.

♦ ♦ ♦

George W. Wilmot, 69, vice president of the Weatherly Foundry & Mfg. Co., Weatherly, Pa., died March 16, in Hazelton, Pa. He served as superintendent of the Maryd mine for three years and in 1908 founded the Wilmot Engineering Co. He was also connected with the Croll-Reynolds Co., New York.

♦ ♦ ♦

Grant Morrison, 71, president and treasurer, Bay City Iron Co., Bay City, Mich., died March 9. Mr. Morrison was born in Oswego county, New York. He went to Bay City when a youth, and first became associated with the iron works in 1903 as bookkeeper, later becoming an executive.

♦ ♦ ♦

William L. Deming, 84, president, Deming Co., Salem, O., died March 8. In 1882 he became affiliated with the Silver & Deming Mfg. Co., and when the Deming Co. was organized in 1890 to take over the pump manufacturing business of the former company, Mr. Deming was made secretary. In 1895 he was elected vice president and secretary, and in 1921 became president. He was active in the civic affairs of Salem.

Study Operation, Plant and Equipment

Policyholders service bureau, Metropolitan Life Insurance Co., New York, has issued two publications pertaining to business management. One deals with an operation study, consisting of an analysis of conditions under which work is performed, motions used in performing the work, elimination of useless motions or idle time, timing of the job for establishing rates, laying out production schedules, supplying standard cost data and providing standard instruction and labor requirements.

The second part deals with "Accounting for Plant and Equipment", and presents a survey of 46 companies engaged in diversified lines of business. The scope of the plant and equipment procedure records, in regard to companies of different sizes and different fields, is classified in five divisions, namely land, land improvements, buildings, machinery, and office furniture and fixtures. The report discusses the plant ledger, taking into consideration information recorded, adaptation to income tax requirements, supporting records, and records of transfer.

We invite you to visit our exhibit in Booths

252, 254, 256, 291, 293, 295

at the

Detroit Convention on May 4th to 9th

11-F Combination Heavy Duty Jolt and Power Squeezer. Weight 1300 lbs. 11¼ in. Squeeze Piston. 5¼ in. Jolt Piston. Jolt Capacity 400 lbs.

and inspect the high quality of workmanship and materials in these machines.

- ORIGINAL IN DESIGN
- SIMPLEST IN OPERATION
- STURDIEST IN CONSTRUCTION
- LOWEST COST FOR MAINTENANCE

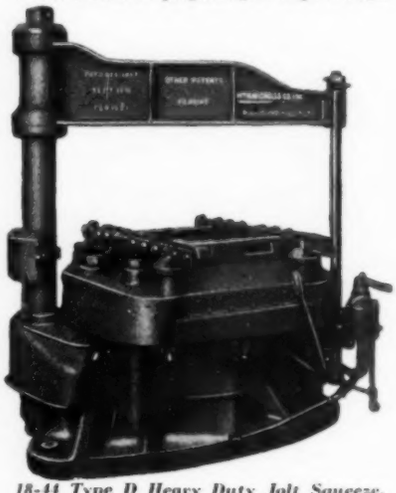
Meeting the demand for greater production — more uniform castings, with lowest percentage of loss.

If you have a job to make on molding machines of these types and you wish further information, kindly send us a sketch of the pattern, size of flask and number of castings required per day.

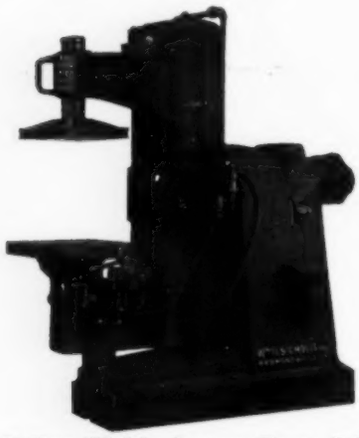
These machines protected by Patents

12-36 Type D Heavy Duty Jolt Squeeze and Pattern Draw. Weight 2475 lbs. 12¼ in. Squeeze Piston. 6 in. Jolt Piston. 36 in. between Uprights. Jolt Cap. 700 lbs.

14-36 Type D Heavy Duty Jolt Squeeze and Pattern Draw. Weight 2500 lbs. 14 in. sq. Piston. 6 in. Jolt Piston. Jolt Cap. 700 lbs. 36 in. between Uprights



18-44 Type D Heavy Duty Jolt Squeeze, Pattern Draw, with Flask Roll-off. Weight 6000 lbs. 18⅜ in. Squeeze Piston. 8 in. Jolt Piston. Jolt Capacity 1000 lbs. 42 in. between Uprights



18 Type RT Jolt, Squeeze, Clamp, Roll-over and Pattern Draw. 7 in. Jolt Piston and two 13½ in. Squeeze Pistons in tandem. Weight 7500 lbs.

33 Type RH Jolt, Roll-Over, Squeeze and Pattern Draw. 33 in. Squeeze Piston. 18 in. Jolt Piston. Capacity 7000 lbs. Weight 30,000 lbs.

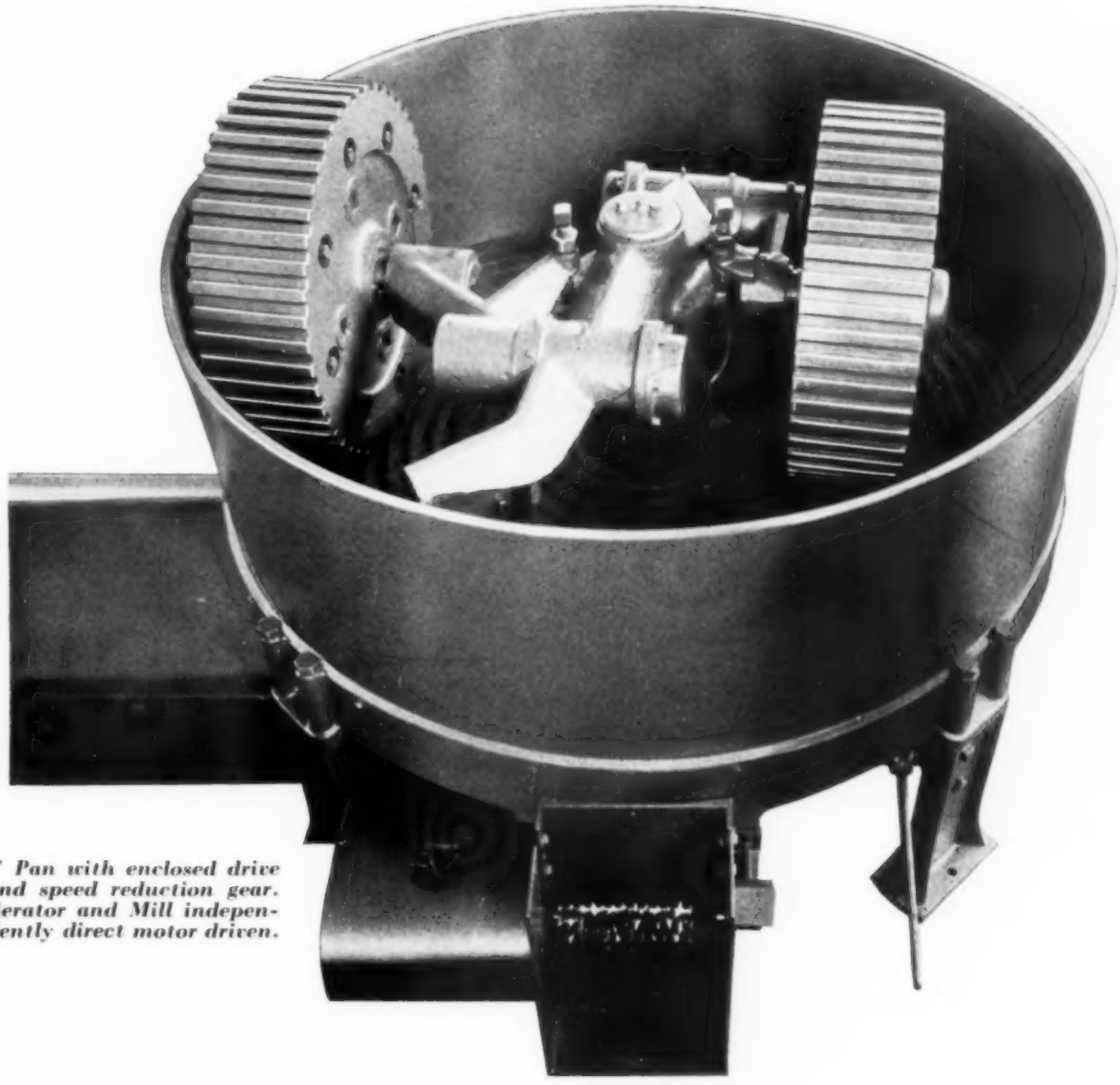
WM. H. NICHOLLS CO., INC.

Richmond Hill, Long Island, N. Y.

Foreign Manufacturers and Selling Agents—
For Germany, Switzerland and Italy: Societe Anonyme des Acieries Georges Fischer, Schaffhouse, Switzerland

—*also on Exhibition*

The NICHOLLS IMPROVED MULLER



6' Pan with enclosed drive and speed reduction gear. Aerator and Mill independently direct motor driven.

This Muller together with a number of our molding machines (see opposite page) will be exhibited at the Foundry Convention in Detroit.

WM. H. NICHOLLS CO., INC.

Richmond Hill, Long Island, N. Y.

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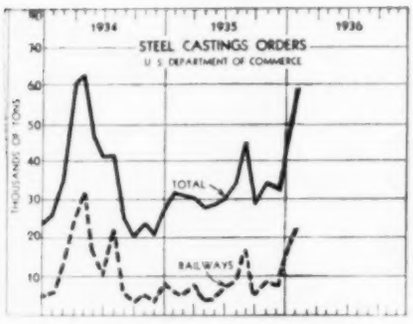
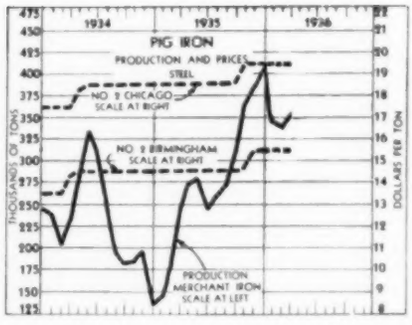
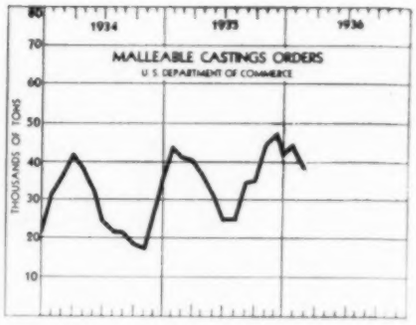






Foundry Activities

Reflect Industrial Trends

KEEN FOUNDRY CO., Griffith, Ind., is operating at near-capacity and is adding a new core room building, 70 x 100 feet, to its facilities. The addition will be fully equipped with the latest type insulated ovens and machinery, and will be of fire-proof construction. Also, a sand storage building will be erected of concrete and steel, 40 x 90 feet. Contract has been let to the Henderlong Lumber Co., and completion is scheduled for 60 days. days.

* * *

Northwestern Brass Foundry Co., St. Louis, recently suffered damage by fire estimated at $3800.

* * *

Glascock Stove & Mfg. Co., Greensboro, N. C., has let contract to F. D. Lewis & Sons, for a $13,000 addition to its Greensboro plant.

* * *

American Broach & Machine Co., Ann Arbor, Mich., recently merged with the Sundstrand Machine Tool Co., Rockford, Ill.

* * *

Cooper-Bessemer Co., Mt. Vernon, O., is considering reopening its foundry in Mt. Vernon. B. B. Williams is president.

* * *

Packard Motor Car Co., Detroit, will construct a foundry and crane extension at its plant. Albert Kahn Inc., Detroit, is architect.

* * *

Berted Foundry Co., Columbiana, O., has been incorporated by Alton N. Etling, Raymond O. Morgan, and Edward A. McDonald.

* * *

Storage building of the Huntington Stove & Foundry Co., East Huntington, W. Va., was damaged by fire recently.

* * *

Sullivan Stove Foundry Inc., 201 South Broad street, Sullivan, Ind., has changed the address of its principal office and is now located at Lyons, Ind.

* * *

Lakey Foundry & Machine Co., Muskegon, Mich., recently received release orders for the largest quantity of refrigeration castings in its history, resulting in the addition of another shift. Also it has increased production in its cylinder block foundry.

* * *

Wise Foundry Machine & Supply Co., Zanesville, O., has under consideration the construction of a storage and shop building, to cost approximately $37,000.

* * *

Fanner Mfg. Co., Brookside park, Cleveland, has leased the factory building formerly occupied by the Monarch Metal Co., Hamilton, Ont., which consists of 20,000 feet of floor space.

* * *

Challenge Machine Co., Grand Rapids, Mich., plans the erection of a foundry building for which details have recently been completed by Pierre Lindhout, architect, 725 Michigan Trust building, Grand Rapids.

* * *

Standard Auto Parts Corp., 660 Nims street, Muskegon, Mich., will build a new foundry and factory building, for which plans have been completed by Roger Allen, architect, 463 Houseman building, Grand Rapids, Mich.

* * *

Zenith Mfg. Co., Bucyrus, O., has been incorporated and will take over a shop formerly owned by the W. A. Riddell Co., to do general foundry work and manufacture automobile cylinder heads, manifolds, and piston rings and pins. Arthur W. Sieglaff is president.

* * *

Index of foundry equipment orders, according to a report of the Foundry Equipment Manufacturers association, was 110.4 in February, as compared with 127.0 in January.

(*Continued on page* 134)

RAW MATERIAL PRICES
March 6, 1936

Iron	
No. 2 foundry, Valley	$19.50
No. 2 Southern, Birmingham	15.50
No. 2 foundry, Chicago	19.50
No. 2 foundry, Buffalo	19.50
Basic, Buffalo	18.50
Basic, Valley	19.00
Malleable, Chicago	19.50
Malleable, Buffalo	20.00
Charcoal iron, furnace	22.00
Coke	
Connellsville beehive premium	$5.50
Wise county beehive coke	$ 5.35 to 5.50
Detroit by-product coke	9.00
Scrap	
Heavy melting steel, Valley	$16.00 to $16.50
Heavy melting steel, Pitts. (dlv.)	15.50 to 16.00
Heavy melting steel, Chicago	14.50 to 15.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Chicago	8.50 to 9.00
No. 1 cast, New York	10.00 to 10.25
No. 1 cast, mchy., Chicago	13.50 to 14.00
No. 1 cast, Pittsburgh	14.00 to 14.50
No. 1 cast, Philadelphia	14.50 to 15.00
No. 1 cast, Birmingham	11.00 to 12.00
Car wheels, iron, Pittsburgh	14.50 to 15.00
Car wheels, iron, Chicago	14.25 to 14.75
Railroad malleable, Chicago	17.75 to 18.25
Malleable, Buffalo	15.75 to 16.25
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	8.95 to 9.00
Straits tin	47.50
Aluminum, 99 per cent	19.00 to 21.00
Aluminum, No. 12 (Secondary, standard)	17.00
Lead, New York	4.60
Antimony, New York	13.25
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	4.90

6 Schneible multi-wash dust collectors at DODGE-CHRYSLER CORP.

Three of the six Schneible Multi-Wash Dust Collectors used for collecting dust from the shake-outs, abrasive blast machines, grinding wheels, and sand conditioning plant are shown above.

The Schneible Dust Suppression Equipment includes Schneible Multi-Wash Dust Collectors, Multi-Louver Dewatering Tanks, and "Wear-Proof" Pumps. Time-tested equipments designed for the job.

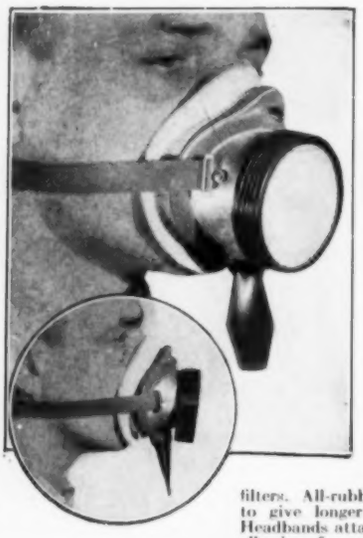
Six Schneible Multi-Wash Dust Collectors are used in the foundry of the Dodge-Chrysler Corporation at Detroit for suppressing dust created at their shake-outs, abrasive blast machines, in their grinding departments, and at their sand conditioning plants. These Schneible Multi-Wash Dust Collectors, each of 10,000 c.f.m. capacity are doing a positive, efficient job of dust arresting.

Multi-Wash Collectors are simple, fool-proof, trouble-free, and highly efficient. They have no moving parts, spray nozzles, pockets, or dead zones. Nothing to break, wear, clean, adjust, or maintain. Equally efficient on dirty air, hot gases, or noxious fumes.

Eliminate the dust hazard in your foundry! Let us tell you why more than 50 Schneible Multi-Wash Dust Collectors have been installed during the first year since it was offered the foundry industry. A request for detailed information implies no obligation.

CLAUDE B. SCHNEIBLE COMPANY

3951 Lawrence Avenue, Chicago, Illinois



MODEL M-2 PULMOSAN RESPIRATOR

Designed to meet industrial dust conditions. Gives effective protection against inhaling dusts such as lead, silica, paint spray mists and similar breathing hazards.

This respirator permits much easier breathing for three reasons:

1. Filter size increased to 3-inch diameter. 2. Coarser mesh screens used. 3. Filter cap arranged to keep filters away from intake orifice. Only Pulmosan tested filters used. Has patented Pulmosan non-inflated rubber face cushion to give greater comfort and perfect fit. Screens bound with aluminum for greater strength, and safety in changing and replacing filters. All-rubber, adjustable headbands used, to give longer wear than old-style elastic. Headbands attached by exclusive swivel joint, allowing free movement without danger of respirator leaving face. Headbands easily changed. Positive exhaust valve is identical to those in Gas Masks. Filter cap and cup are plated to prevent corrosion. Cup is offset downward to give unobstructed vision. Aluminum body designed to conform to any face.

Packed individually. Six extra filters with each respirator.

MODEL M-15 RESPIRATOR

This extra heavy duty pouch-filter respirator was built to meet the approval of the Department of Interior, Bureau of Mines Schedule No. 21 after exhaustive tests in fine dust in our own laboratory under expert supervision and according to the manner of tests conducted under this Schedule.

The main body is pressed aluminum to which is attached a patented non-inflated cushion compounded of non-irritating, non-toxic rubber.

All-rubber headbands are attached by an exclusive swivel joint that allows freedom of movement without danger of the respirator's leaving the face. Headbands are easily changed and the positive exhaust valve is identical to those used on gas masks.

The pouch of approximately 49 square inches in size is constructed from a special single-faced gray filtering material having a high efficiency against the finest of dust, yet of such a construction that the breathing resistance is of the lowest. These tests were conducted over long periods to determine the correct filtering material, shape and construction with the one thought in mind, to give the very utmost protection.

SAFETY
IN THE FOUNDRY
with
Pulmosan Safety Equipment

★

Pulmosan Safety Equipment Corp.

386 Jay Street — Brooklyn, N. Y.

PULMOSAN SAND BLAST HELMET —MODEL NO. 64

The advantages of using this helmet are many, we are citing only a few: As the operator is supplied with fresh air continually, breathing entails no efforts, causing no exhaustion. The air supply keeps it cool, therefore the sand blaster can work in it for long periods.

Made of heavy rubber interlined cloth tailored to shoulders, with front screen that works on a slide.

Furnished with wire screen or glass front as specified.

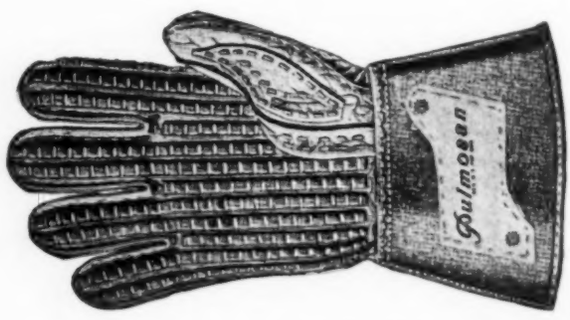
Equipped with 6 feet of hose and carrying belt.

Extra screens can be furnished.

SAFEGUARD NO. 644—GAUNTLET GLOVE

Widely sought glove, reinforced with steel ribbons over strips of tough leather, closed with steel threads; extra leather patch on thumb.

(No. 1044 same glove in horsehide.)



ENGINEERED FOR THE JOB!

This installation in one of Detroit's foremost automobile foundries is another tribute to MODERN engineers. Modern was called in when equipment recommended by others failed to meet the situation. In two weeks time Modern pouring equipment converted an unsuccessful situation into one of unquestioned success.

Tons of metal are now handled in record time; with pouring devices engineered for the job; pouring proceeds orderly with a minimum of help; no pourer subjected to the hardships endured in hand pouring; clean, hot metal is supplied as required. No conveyor molding unit is complete without such pouring equipment.

You too need a Modern-engineered metal handling system to get full foundry efficiency. With the hot weather ahead, action on this matter is more urgent than any other improvement. Send us your inquiry without delay.

Patented & Patents Pending

MODERN EQUIPMENT CO.

FORT WASHINGTON, WIS.

See the latest in Modern Sealed Heat Developments at the

Detroit Convention

MODERN

Covered and Insulated Ladles

Lifetime Geared Ladles

Improved Bottom-Pour Ladles

Metal Pouring Systems

Crane and Monorail Systems for Metal and Mold Handling

Furnace Charging Cranes

Sand Conditioning Systems

MODERN EQUIPMENT CO.

(*Continued from page* 130)

and 74.2 in February, 1935. Index of shipments in February was 114.5, in January 110.4 and in February, 1935, 85.1.

* * *

Reorganization plan of the Universal Pipe & Radiator Co., New York, under section 77-B of the Bankruptcy act, provides that assets be held by the Central Foundry Co., New York, now a subsidiary of Universal Pipe & Radiator. The new company will have an authorized capitalization of $1,000,000.

* * *

Production of gray iron castings declined 16.1 per cent during February, according to reports received by the industrial research department of the University of Pennsylvania from foundries operating in the Philadelphia federal reserve district. Tonnage of iron and steel castings shipped was smaller than that delivered in January, showing the first decline in shipments since last November. Steel foundries showed a noticeable decline in their volume of unfilled orders, but the gray iron and malleable iron foundries increased more than 80 per cent in their backlog.

* * *

Arneson Foundry Inc., Kenosha, Wis., has been organized by T. J. and A. E. Arneson and L. A. Lilley.

* * *

J. M. Bruce Co. foundry plant in Cedar Grove, Wis., was badly damaged by fire recently. Rebuilding of the works has been started.

* * *

Ralph M. Fisher has been appointed receiver for the Reed Foundry & Machine Co., Kalamazoo, Mich. The company at present will be operated as a going concern.

* * *

Stenzel Pattern Works, Houston, Tex., has moved its pattern and model works to a new building at 3536 Navigation boulevard. The new building is thoroughly equipped.

* * *

National Bearing Metals Co., 4930 Manchester avenue, St. Louis, has purchased the former plant of the American Brake Shoe & Foundry Co., 332 South Michigan avenue, Chicago. The plant will be reopened to manufacture bronze and brass castings for locomotives, car journal bearings and other railroad specialties.

* * *

Service Foundry Inc., New Orleans, La., has purchased a one-story building at 1150 Tchoupitoulas street, New Orleans. A new structure will be erected, after the building is demolished.

* * *

Plans for reopening the Illinois Foundry & Specialty Co., East Armstrong street, Morris, Ill., were discussed recently by a group of business men of Morris, with D. A. Cullinan, secretary, and E. W. Buck, treasurer, representing the Western Foundry Co., Chicago.

* * *

A. R. Fosdick & Sons, Decatur, Mich., has sold its foundry to Murdick Bros., South Bend, Ind. The new owners will move the plant to Lawton, Ind., where they will continue the business and add new items for the manufacture of tractor and plow facilities.

* * *

Enterprise Foundry Co., San Francisco, has purchased a portion of the Rich Mfg. Co. plant in Los Angeles, manufacturer of gas and diesel engines and marine motors. Frank Gilmore, vice president and general manager of the new combined plant will be in charge of operations in Los Angeles. The Enterprise company made this purchase for the purpose of moving its subsidiary gas engine plant to Los Angeles.

* * *

Merger of the Sparta Foundry Co., Sparta, Mich., and the Muskegon Piston Ring Co., Muskegon, Mich., has been proposed to stockholders of both concerns. Under the proposed plan the Sparta Foundry Co. will acquire all properties, assets and business, including the name and franchises of the Muskegon Piston Ring Co., subject to all its debts, liabilities, and obligations as of the date of consummation of the plan.

* * *

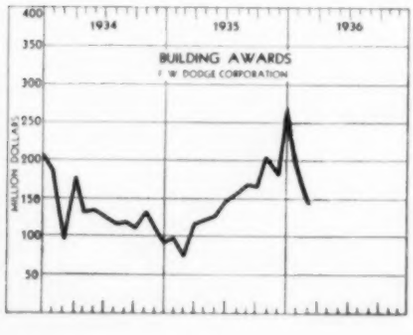
Niles-Bement-Pond Co., New York, owner of Pratt & Whitney Co., Hartford, Conn., is working on a plan to merge with General Machinery Corp., Hamilton, O. A new company of the same name will be formed, with officers to be as follows: Edwards A. Deeds, chairman; George A. Rentschler, president; Clayton R. Burt, A. A. Byerlein, Robert M. Derby, Curtis T. Ziegler and Charles K. Seymour, vice presidents, the latter also being treasurer; and B. E. Johann, secretary. Mr. Seymour is now president of Niles-Bement-Pond; Mr. Rentschler is president of General Machinery; Mr. Burt, president of Pratt & Whitney.

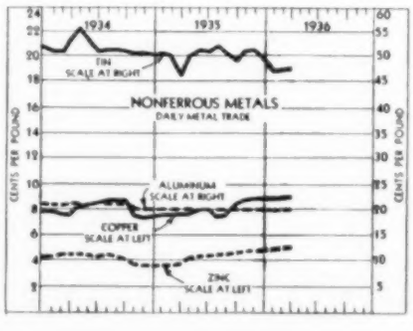
NEW *Trade Publications*

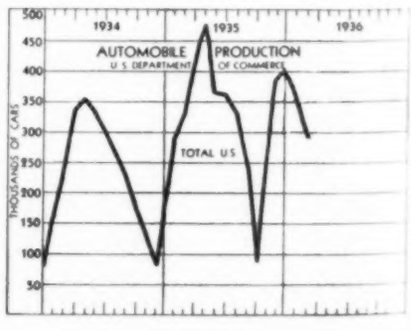
ABRASIVES — Sterling Grinding Wheel Co., Tiffin, O., recently published an exceptionally attractive booklet discussing its aluminous oxide and silicon carbide wheels for a wide variety of uses. Exceptional treatment of the illustrations adds to the attractiveness of the publication.

PLANT CONDITIONING—Sherwin-Williams Co., Cleveland, has published a catalog entitled "Save-Lite." The presentation is an excellent and thorough analysis of plant conditioning. Emphasizing the effects brought about by the application of paint, plant interiors are discussed, comparisons given by illustration, and paint-

(*Concluded on page* 136)







Instantly Successful!

ROYALITE

. . . A NEW DEVELOPMENT BY THE OLDEST MAKER OF GRINDING WHEELS

[A U. S. Rubber Subsidiary Built the First One in 1865]

REPORTS from foundries and engineers in various parts of the country indicate that the new Royalite high-speed wheels are charting new performance records in speeding up the snagging of malleable and steel castings, and at the same time reducing operating costs appreciably.

It took five years of patient, intensive development, and merciless testing in the U. S. Laboratories, to completely satisfy our engineers that in the new ROYALITE we had the ultimate in grinding wheels. Experiment with a great many other bonding agents only emphasized the incomparable practical advantages of ROYALITE composition.

In steel and malleable iron foundries and Billet Grinding in steel mills, where rough grinding holds sway and excess metal must be removed quickly, ROYALITE wheels will show greater economy.

Your search, then, for the right high-speed snagging wheel ends with ROYALITE. Available through branches in 32 industrial centers.

UNITED STATES RUBBER PRODUCTS, INC.
1790 BROADWAY NEW YORK, N. Y.

United States Rubber Company

(*Concluded from page* 134)

ing points set forth. Outstanding examples are given concerning the use of paint.

GEAR CHUCKS—Garrison Machine Works Inc., Dayton, O., has published a folder which gives two examples of the manner in which the installation of the company's bevel gear chuck increased production and eliminated trouble.

TRUCKS—Lewis-Shepard Co., 245 Walnut street, Boston, has published circular No. 317 devoted exclusively to factory and warehouse floor trucks and lift trucks equipped with noiseless, easy rolling, rubber-tired wheels. Advantages and uses are featured.

FANS—Wagner Electric Corp., 6400 Plymouth avenue, St. Louis, recently has published a bulletin citing the more outstanding features of its portable, ventilating air circulating, ceiling, and exhaust fans. Prices, uses, details of construction, and methods of placement, are discussed.

CONVEYING EQUIPMENT—Palmer-Bee Co., Westminster and G. T. railroad, Detroit, recently issued section 111 of its general catalog No. 100 with specific reference to skip hoist and drag line machinery. Specifications, diagrams, and illustrations pertinent to the handling of material are included.

WELDING RODS—American Manganese Steel Co., Chicago Heights, Ill., has published a bulletin concerning hard-facing welding rods No. 459 and No. 217. Also included is information and photographs on hard-surfacing rods, typical uses, reports from users, and a brief listing of suggestions for welding.

PNEUMATIC HOSE — Republic Rubber Co., Youngstown, O., emphasizes its new oil-resisting tubes in a recent leaflet. Adaptations are shown to point out the strength and ruggedness of these products for air drill service in mines, quarries, rock industries, and various construction uses. Sizes, lengths and plies are included.

OPTICAL PYROMETERS—Pyrometer Instrument Co., 103 Lafayette street, New York, in catalog No. 70 points out concisely the characteristics, maintenance, and furnishings of the pyro simplified optical pyrometer. Information required for operation is included and details of maintenance and accessories are discussed.

COMPRESSORS — Ingersoll-Rand Co., 11 Broadway, New York, displays in a bulletin details concerning direct-connected, electric-driven and flat-belt, V-belt, or other drive compressor units. Capacities covered range from 50 to 250-horsepower for single or multistage compression. Outstanding characteristics of these heavy-duty facilities are outlined.

PROJECTORS—Bausch & Lomb Optical Co., Rochester, N. Y. has prepared a bulletin on micro-projectors. The bulletin is prefaced by an observation concerning the time and equipment saved by the use of the projector in instruction. Photographs, specifications, and features of this company's products are given, including the triple-purpose micro-projector, a micro-projector designed for a standard microscope, a permanently aligned micro-projector and accessories, and an instrument for binocular observation.

IDLERS—Chain Belt Co., 1600 West Bruce street, Milwaukee, has sent out bulletin No. 266, a graphic, highly illustrative sheet of information concerning the Rex-Stearns idlers. A large-sized diagram points out construction of the idlers and the remainder indicates methods of handling various types of work, including foundry sand handling.

Faked Foundry Facts

Shrink Cavity

ELECTRIC FURNACES—American Bridge Co., Frick building, Pittsburgh, has published a catalog submitting literature and photographs, with salient features of the company's 3-phase direct arc electric furnace. Capacities, sizes, charging methods, suggestions as to installation, layouts, advantages of design, and list of users, are a few of the other features presented.

DIESEL ELECTRIC GENERATORS — Caterpillar Tractor Co., Peoria, Ill., has prepared a folder illustrating and describing three sizes of diesel electric direct-connected generator sets. Each unit consists of a diesel engine equipped with auxiliary fuel pump with 1-gallon overflow tank, close regulation speed governor and manual control, direct connected to an electric generator, and assembled on a cast iron base.

SMOKE-RECORDERS—Leeds & Northrup Co., 4992 Stenton avenue, Philadelphia, has prepared catalog N-93 applying to the micromax smoke-density recorders and standard micromax instruments. Indicating the method by which these operate, the publication gives conditions under which they may be installed, their adaptability, range, principles of measurement, and mounting dimensions.

MONORAIL DRIVE — American Monorail Co., 13107 Athens avenue, Cleveland, has prepared a booklet containing 24 pages of data referring to the various electric drives for crane hoists and carrier units. The American Mono-Tractor is described extensively, showing its advantages, nine operations by remote control, and uses. Other handling units are specified.

BEARINGS—Timken Roller Bearing Co., Canton, O., has published a crane section to its Engineering journal, covering the application of tapered roller bearings to crane machinery. Cross travel, hoist, line and drum shafts, together with drive mountings, wheel mountings for tapered tread track wheels, as well as flat or radius treads, sheaves, blocks and hooks, are shown equipped with these bearings.

PNEUMATIC TOOLS — Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, Cleveland, has published a bulletin on rotary grinders. The bulletin features data on the rotary motor around which these grinders are built, and includes a clear blueprint giving construction details. Different styles and sizes are illustrated and reference is made to the company's rotary sanders, wheels and brushes for grinders, file and bur machines, bench and floor hammers, and other accessory tools.

LABORATORY GLASSWARE—Kimble Glass Co., Vineland, N. J., has published a catalog containing listings, illustrations, and specifications of all its graduated glassware for industrial, commercial, educational, and research laboratories. The line is claimed to be a precision grade, individually retested, and assured within the limits set forth in circular No. 9 of the National Bureau of Standards. Every piece is annealed after all forming operations have been completed.

PORTABLE ELECTRIC TOOLS—Chicago Pneumatic Tool Co., 6 East Forty-fourth street, New York, has published catalog No. 900 presenting a clear picture of this company's portable electric tools. The publication is divided into the following sections: Drill and reamer; screw driver, nut runner, stud setter, and tapper—construction details and typical installations; and grinder, buffer, polisher, and sander. Specifications, weights, and speed of each, including specially designed tools for unusual purposes, are added.

LIGHTING FIXTURES—Benjamin Electric Mfg. Co., Des Plaines, Ill., in a supplementary section to catalog No. 26, presents the operation, color composition, and advantages of the new 400-watt high intensity mercury vapor lamp, for various types of interior and exterior illumination. In addition, complete description, illustrations, dimensions, and list prices on lighting fixtures, tables on illumination calculations, and a method of designing a lighting system, including design of a special lighting system consisting of a combination mercury lamp and incandescent lamp, is presented.

Grinding a steel casting —Floor type pedestal mounted Equipment

FOUNDRIES—PATTERN SHOPS MACHINE SHOPS

And Other Metal Working Plants

In any of these there are scores of jobs that can best be handled with flexible shaft equipment.

Semi heavy duty grinding forms a large part of these jobs . . . and it is for this type of work that the HASKINS H-6 multi-speed equipment was designed.

Haskins H-6 Equipment Bench Height Pedestal

Operators like this sturdy machine . . . it's easy to move about the shop . . . easy to use . . . and it has plenty of power to do the job. Can be had in either of the mountings shown.

A *lighter* and more flexible equipment is needed by the pattern maker, while *more* power, and in many cases a truck mounted machine, is required for very heavy foundry work. Whatever your requirements may be it will pay you to investigate the Haskins line of flexible shaft equipment.

R. G. HASKINS COMPANY

4635 W. Fulton St. Chicago

DIAMOND SAND BLAST

DIAMOND

LIKE the diamonds from which we take the brand name, Diamond Sand Blast Sand is clean, sharp, fast cutting. Ideal for all manner of sand blasting, being especially prepared for this kind of work.

Call on us to assist you in solving your sand blast problems.

Sand Blast Sand

FOR FAST CLEANING AND FINE FINISH standardize on Diamond Sand Blast Sand. It gives results that are impossible to duplicate with other forms of abrasives, and besides, it is the most economical cleaning agent you can employ.

WASHED, DRIED AND SCREENED SPECIAL SANDS FOR STEEL MOULDING, FURNACE BOTTOMS, CORES, OPENERS,—AND SILICA FLOUR

OTTAWA SILICA COMPANY

Ottawa, Illinois

2 YR. GUARANTEE

-against all repairs

This Fox Rapid Production Stand grinder is a high speed heavy duty unit, built to out-produce and out-last all competition. *Smooth running* is the answer.

Some of these grinders after 6 years of continuous operation, retain their original bearings and are still going strong.

The rugged construction, with the heavy duty bearings used, provides these grinders with an exceptionally long, trouble-free life.

Fox Stand grinders are *guaranteed against repairs for a period of two years.*

Three speeds are available through a quick acting belt change arrangement which is in turn protected by a fool proof safety device.

Just off the Press

This new bulletin, just off the press, besides giving you a complete picture of all the Cyril A. Fox line of grinders, offers some worthwhile hints on economical grinding practice in general.

Send for this bulletin today. There is no obligation and it may answer a long-standing problem.

Self aligning, Dust Proof, Ball Bearing Spindle on Outer Side of Motor Pulley.

Cyril A. Fox

OLIVER BLDG., PITTSBURGH, PA., U. S. A.

HANNA PIG IRON

—dependable uniformity

BRANDS:

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GRADES:

Foundry—Malleable

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MERCHANT PIG IRON DIVISION
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BRANFORD VIBRATORS

Vibrator Flask Rapper (above)

Vibrators for all foundry uses

The New Haven Vibrator Co., Inc.

10 Stiles Street

P. O. Box 1669 — Phone—New Haven 4-1444

New Haven, Conn.

The above company has acquired
by purchase from
The Malleable Iron Fittings Co.
their line of
Branford Vibrators and Accessories
and will continue the same prompt deliveries
and the same high quality of goods.

MOGUL GREEN MOGUL SAND MOGUL BOND

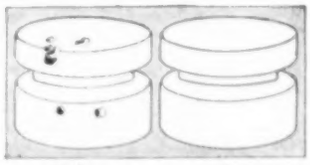
As a green sand bond and facing, Mogul has won a commanding place in progressive core rooms throughout the Metal Casting industry.

Mogul will aid in producing consistently fine, uniform cores.

Ask us to prove it—there is no obligation.

Corn Products Sales Co.
17 BATTERY PLACE, NEW YORK, N. Y.

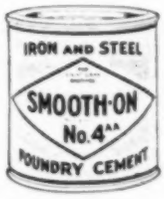
EVERY CASTING SAVED IS MONEY EARNED


Before After

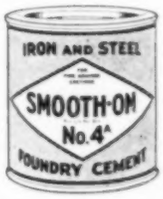
FILLINGS of Smooth-On No. 4 in sand holes, blow holes and other depressions which harm nothing but appearance make good castings better. The surface correction reclaims an astonishing tonnage, and the better value is equally welcome to the customer.

SMOOTH-ON No. 4

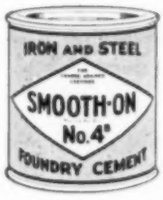
is applied like putty, grips like a weld when hardened, looks like iron because it is iron, expands and contracts like iron and can be filed like iron. Three grades offer a choice for perfect color, lustre and texture match on any iron or steel casting.



Smooth-On No. 4AA. For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish.



Smooth-On No. 4A. For medium gray castings. A fine grained cement that has a good metallic lustre.



Smooth-On No. 4B. For dark gray castings. A cement of coarser grain and darker shade.

These compositions applied in the usual way meet ordinary needs, but modification of lustre and shade is easily obtained by rubbing the *dry* powder on top of the applied filling. This lightens the shade.

The free *hardened* samples will show you the general effect, and application of the free *working* samples will prove that you *can* get perfect match—easily, quickly and cheaply.

FREE HARDENED and WORKING SAMPLES

Mail coupon for samples and prices. Smooth-On Nos. 4AA, 4A and 4B are packed in 1 lb. and 5 lb. cans, 25 lb. pails and 100 lb. kegs.

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Please send *working* samples of
☐ Smooth-On No. 4AA ☐ Smooth-On No. 4A ☐ Smooth-On No. 4B
☐ Hardened samples of all three

Name.....

Address.....

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4-36

Do it with **SMOOTH-ON**

nine

Hickman, Williams & Co. offices located in nine business centers totally encompass the industrial United States.

Your inquiries for Ferro Alloys, Pig Iron, Coal and Coke, to any one of these offices are assured of immediate personal attention.

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"Almost a half century of dependable service, supplying ferro-alloys, pig iron, coal, and coke to the entire metal working industry."

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For the Foundry
For the Machine Shop
For the Pattern Shop

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Many Types and Sizes

HIGH QUALITY EQUIPMENT ONLY

LONG LIFE EXCELLENT SERVICE

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PYRO THE SIMPLIFIED OPTICAL PYROMETER

THE ONLY SELF-CONTAINED DIRECT READING SPECIAL FOUNDRY-TYPE PYROMETER

It eliminates guesswork, waste and spoilage. Guarantees uniform, sound castings.

Its unique construction enables the operator to determine rapidly the temperature even on minute spots, fast-moving objects or the smallest streams. No correction charts—no accessories—No upkeep. Special FOUNDRY TYPE has standard calibrated range and additional DIRECT reading RED SCALE, indicating TRUE SPOUT and POURING TEMPERATURES of MOLTEN IRON and STEEL WHEN MEASURED IN THE OPEN.

PYRO is STANDARD with all leading and progressive Foundries throughout the country—they endorse and recommend its use.

For non-ferrous metals use PYRO IMMERSION Pyrometer.

Write for special catalogue

The Pyrometer Instrument Co.
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STANDARD of CORE OIL QUALITY

No matter how large or small your plant or what type of castings you produce we have special grades of oils formulated to produce maximum efficiency at minimum cost.

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Truscon Foundry Flasks of heavy-gauge, rust-resisting, copper-bearing alloy steel are built for hard service and long life. Ribs and flanges extend full height around entire flask with no buckling or cutting away of metal.

All dowel pin brackets and handles are heavy malleable or pressed steel, riveted or electrically welded. Durability, rugged strength with light weight combine to make Truscon Flasks the standard for the industry.

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Send for a FREE copy of this 48-page Catalog containing helpful information about Truscon Alloy Steel Foundry Flasks and accessories.

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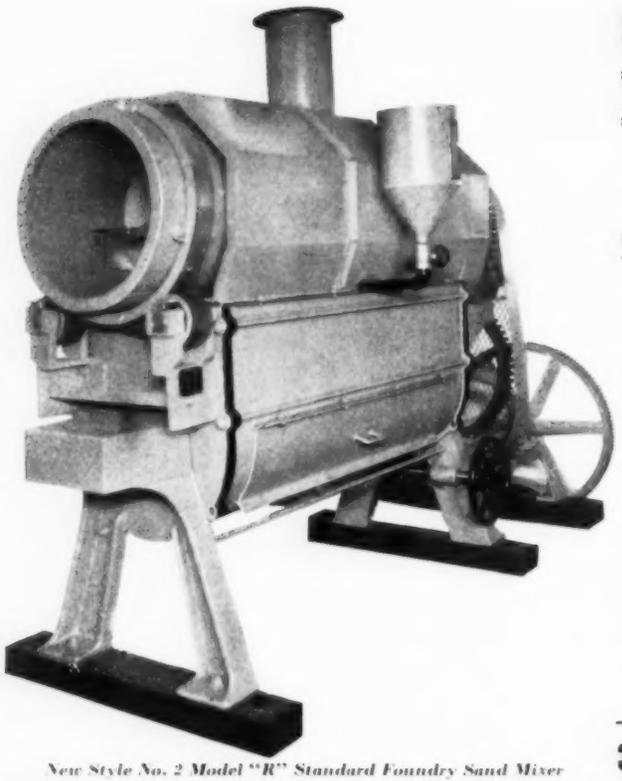

New Style No. 2 Model "R" Standard Foundry Sand Mixer

SEE THE STANDARD MIXER!

AT A. F. A. CONVENTION, DETROIT, MAY 4-9

THE LATEST DESIGN No. 2 MOD. "R"
STANDARD SAND MIXER

—as shown in the cut opposite—complete with dust enclosure and outlet for air exhaust of dust and fines, affords simple, complete and efficient sand treatment in a very compact and economical unit.

SEE THIS MACHINE OPERATE!

Witness the effect of the special arrangement of paddles, thoroughly churning the sand with an alternating motion from end to end in the mixer.

35 YEARS OF CONTINUOUS FOUNDRY SERVICE!

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Better Sand will improve Production, Quality, Cost and Sales.

Sand Testing Equipment as illustrated will enable you to secure Better Sand by measuring the sand for Moisture, Permeability and Strength.

Sand—Core—Mold Testing Equipment.

Write for additional information.

Moisture Teller

Sand Rammer

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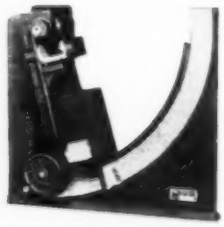

Universal Sand Strength Machine Type C. P.

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Fire Clay and Fire Clay Flour

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Put your casting problems up to us to solve.

Foundry Advisors for 28 Years

McLain's System of making cast iron, semi-steel, cupola malleable and annealed semi-steel (*Pearlitic malleable.*)

Our diagnosis and report on your melting conditions prove that our cupola practice is a science, not a trade.

- SAVE TEN TO TWENTY PERCENT COKE
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- REDUCE TOTAL MELTING TIME
- MAKE SOFT IRON WHEN YOU WANT IT

A McLain trained executive is an asset in your foundry.

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GAGGERS

OF TWISTED STEEL

Franklin twisted steel gaggers overcome "drop-outs" and on account of their distinctive twist are readily recognized and separated from scrap.

The spiral twist permits the use of much smaller gaggers and at the same time provides more than four times the grip on the sand when compared with a larger size deformed bar gagger.

We are also manufacturers of twisted tempered steel tumbling barrel stars.

Pioneers since 1910 in gagger making.

For sale by all foundry supply houses.

FRANKLIN

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Twisted Steel GAGGERS

Four times more grip than other gaggers! Sizes: 1/4"-5/16"-3/8"-1/2"-5/8"

Core Rod & Gagger Co.
Franklin, Pa.

Tempered Twisted STARS

Eight points!—Twelve cleaning edges!—Long life! Sizes: 3/4"-1"-1 1/2"-2"-2 1/2"

REMOVES *the uncertainty of hand-mixing*

CORDIP

• Unbalanced and expensive ingredients that comprise the average hand mixed core wash usually prove costly in both experimental time and resultant failures... CORDIP—the prepared corewash for dipping or spraying dry or green sand cores, requires but the addition of water to produce an effective wash.

May we forward a liberal sample?

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Manufacturers of Mexican Graphite Products since 1891

PLUMBAGO
BLACKING
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. . . That feeling of DEPENDABILITY is "worth its weight in gold"

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Carried in stock by the leading Foundry Supply Jobbers.

Glutrin and Goulac Core Binders have held the fullest confidence of leading foundries for over a quarter of a century. Their remarkable uniformity has contributed to a standardized mix in the core room, assuring the same good casting results day after day and year after year.

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Prepared To Any Specific Size

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Low Phos. & Foundry Specification

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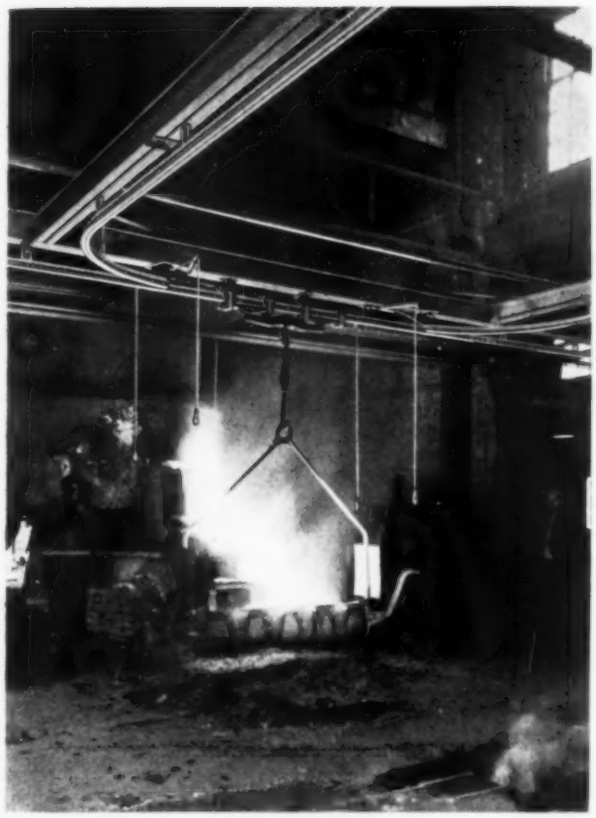

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costs more than Metal!

And, to make a profit on your metal, handling costs must be kept down.

American MonoRail, because of its easy jolt-less operation, gives many foundry operators low cost handling throughout their plants.

An engineer will, without obligation, show you a modern layout fitted to your plant requirements.

Write for new book on Mono-Tractor drive for Cranes, Hoists and Carrier Units.

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of Service In The Foundry Field

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Prompt shipments in mixed carloads, if desired.

● Fine Ground and Rolled Flake for Cupola and Ladle Lining and for all furnace uses.

● Specially prepared high grade pulverized Black Horse brand Fire Clay for facing, bonding and laying fire brick.

If you have never used West Virginia Fire Clay—send us your inquiry.

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WHY BLYSTONE MIXERS give THOROUGH mix

The Blystone Patented Spiral Shovel System is one reason for the QUICK and THOROUGH mix that Blystone Mixers are noted for. In addition, there are other features of construction that contribute to efficient operation. The Blystone Patented Spiral Shovel System SHOVELS, STIRS, and TROWELS the material so thoroughly that it brings out the full value from your oils or other binders giving you the correct porosity for the cores. The NEW Blystone Mixer with many EXCLUSIVE improved features will surprise you with its EFFICIENCY and ECONOMY.

The Blystone Patented Reverse Spiral Shovel System

WE SUPPLY REPLACEMENT PARTS ON ALL MODELS

BLYSTONE MIXERS HAVE IMPORTANT EXCLUSIVE FEATURES

Many Blystone Mixers have been in use for years and are still in operation. As good as the old Blystone Mixers are, don't confuse them with the NEW Mixer with many important EXCLUSIVE features. We are constantly improving our product so that you may obtain a BETTER mix, and we don't want you to COMPARE the OLD Blystone with the NEW. The NEW Blystone Mixer will reduce your mixing cost to the very minimum. Shall be pleased to mail information. WRITE TODAY.

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A NEW CORE TRUCK AT A BETTER PRICE

ALL STEEL TOP
RESILIENT CHASSIS
SOLID TIRE WHEELS
SENSITIVE ACTION

SPECIFICATION

Loading Capacity 500 Pounds
Size of Truck Top 27 x 72
Table Top Height
Solid Rubber Tire Wheel

TYPE B-1

See this CORE TRUCK demonstrated at Booth No. 123 American Foundrymen's Convention

The CM&D CORE TRANSPORT with its spring construction offers better means of core transportation, the bumps of gangways and thresholds are absorbed before they reach the trays. A combination of chassis and elliptical springs give the required resiliency under both light and heavy loads. AVOID DELAYS, WASTE MOTION, CHAFED & BROKEN CORES.

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"Oliver" continues its leadership in pattern shop equipment with this modern unit construction single surface planer. One piece base casting and cylinder yoke insures rigidity and lasting alignment of all moving parts. All rotating parts on ball bearings. Centralized Alemite Zerk lubrication. Any rate of feed. Wiring enclosed. Control centralized to operators left.

These and many other features offer the utmost in a surfacer. Let us have your inquiry for full details of this or any other pattern making machine.

Oliver Machinery Company
Grand Rapids, Michigan, U.S.A.
HIGH GRADE MACHINERY

USE THE CEILING FOR HANDLING

SPEAKING OF *Ideal* FOUNDRIES—

Ideals move ahead with the hands of the clock. Just "monorail" isn't enough for the ideal foundry of today. The monorail you buy should present new possibilities of long life, smooth travel . . . as Louden Monorail does; it should be so built that it can be "hung up" with minimum superstructure . . . as Louden Monorail is. It should be able to grow as your need for it grows . . . as Louden Monorail can.

The list of users of this pioneer Monorail line is almost a "Who's Who" of American foundries and factories. Experienced Louden engineers are at your call to give competent counsel on efficient monorail arrangement. Send for the illustrated book—*"Economical Material Handling;"* 64 interesting pages and yours for the asking.

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Engineers in Principal Cities

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"LONG-WEAR" BLAST CLEANING NOZZLES

GUARANTEE - 1500 hours service with steel abrasives - 750 hours with sand.

★Trade-mark of Norton Co. for Boron Carbide

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The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment
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PEERLESS UNIFORM QUALITY SANDS
maintain standards of the American Foundrymen's Association

MOLDING SANDS
CORE SANDS • BLAST SANDS
STEEL ABRASIVES

Peerless

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WHITNEY BLOCK 'PHONE MAIN-1441 CONNEAUT, OHIO

"The Golden Rule" is the Measure of Peerless Service

Send for Free Sample—

of this Chaplet and see, with your own eyes why it is the most talked of Chaplet on the market today.

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Why It Is Better —

The heavy stem is deeply grooved with seven serrations spiralling from each end toward middle of stem—which eliminates turning in casting or blowing out, speeds and facilitates a perfect fusion, and gives a greater surface area for fusing.

Center sealing band forms a perfect seal against all pressures of gases or liquids and eliminates pressing.

Heads are thoroughly welded to stem—will not come loose.

Furnished at no extra price.

They cost no more than ordinary chaplets.

ANGELL *Improved PressureProof* CHAPLETS

Foundry and malleable pig iron, made with ore only

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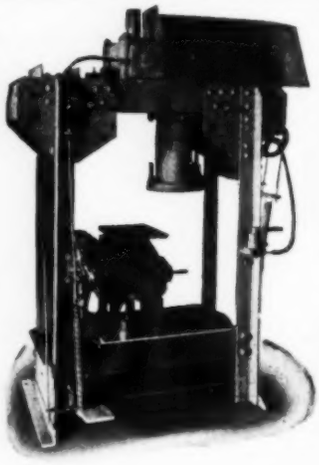

Cores for the above castings are being made universally on our machines, resulting in greatly increased production and better cores.

We have a machine for your job.

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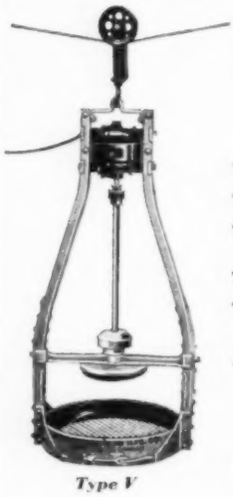
GYRATORY ELECTRIC RIDDLES
Cut Sand Handling Cost



Type V

One man and a Comb's will prepare as much sand as ten or more men using old hand riddling methods.

MADE IN 5 SIZES

Type "V" — 20" dia. round sieve.
Type "CR" — 24" dia. round sieve.
Type "CS" — 24" square sieve with automatic tailing discharge.
Type "V-5" Giant — with a 36" dia. round sieve.
Type HL Laboratory for 8" dia. sieves.

Motor furnished as part of each machine.

30 DAYS FREE TRIAL

REDUCES COSTS SAVES LABOR

Our Type HL Laboratory Sifter makes possible that very necessary "Laboratory Sand Control."

SEND FOR PAMPHLET Z

GREAT WESTERN MFG. CO.
Leavenworth Kansas and Kansas City Mo.

Type HL Laboratory

FOSECO
PRODUCTS

DEGAS
ALUMINUM
WITH
DE-GASER

ELIMINATES GASES AND PINHOLES
INCREASES TENSILE STRENGTH
INCREASES ELONGATION
PRODUCES FINER GRAIN
CLEANER SURFACE
INEXPENSIVE, EASY TO USE
NO FUMES

Send for FREE test sample

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"Fluxations"—Our timely, informative House Organ is yours for the asking!

11 at a clip

No wonder labor cost is down, core production up! Furthermore, Transite Core Plates have reduced their breakage and warpage, and ended corrosion

Johns-Manville
TRANSITE CORE PLATES
JM

CARRY 11 Transite Core Plates? Easily! They weigh about one-quarter as much as metal. A difference that makes for a big reduction in labor costs, a big increase in rate of production.

And when you consider that Transite Core Plates cannot corrode, and that they materially reduce breakage and warpage . . . well, it's easy to understand why the trend is to Transite.

May we send you our new brochure?
Johns-Manville, 22 East 40th Street, New York

. . . more castings in each mold — and more molds can be placed in a given space

. . . if you use

PEERLESS FLASKS
(Tapered Slip)

PEERLESS FLASKS are made either of aluminum or cherry wood construction—strong, accurate and light—and they are easy to handle and operate. Peerless Flasks make every motion of the molder count, and experience has proven that they speed-up foundry production.

These Tapered Slip Flasks are patented and possess many exclusive features.

Send for Catalog No. 371 and be convinced.

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Shafting, Hangers, Collars, Pulleys, Friction Clutches, Ball Bearings, Flexible Couplings, Rope Sheaves, Pillow Blocks, Belt Contactors, "V" Belts, "V" Belt Sheaves and complete "V" Belt Drives.

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ANSWER—

CALCIUM OR MANGANESE BORIDE

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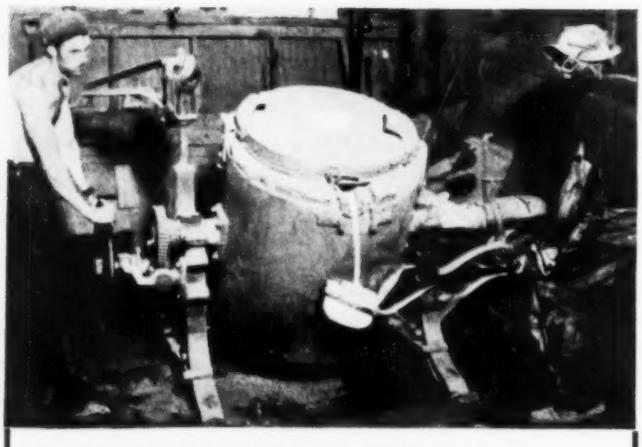

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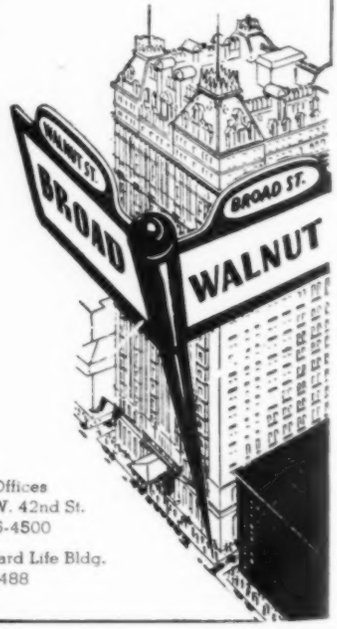

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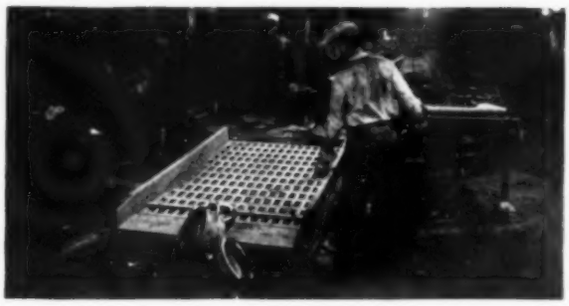

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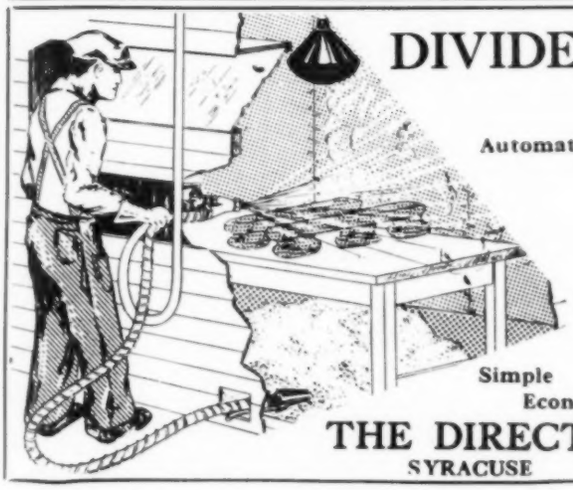

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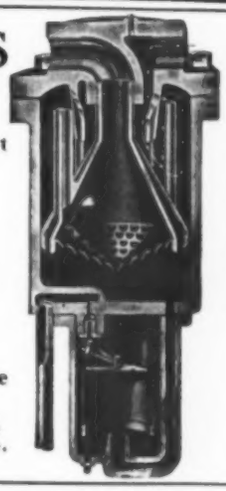

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Experienced metallurgist or foundry engineer with acquaintance of nonferrous foundries along Atlantic Coast or State of Michigan. Must be able to represent himself in sales capacity, alloys and brass ingots. No others need apply. Address Box 482, THE FOUNDRY, Cleveland.

WANTED—SALES REPRESENTATIVES

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Molding foreman who has had experience in rigging, gating and molding, jobbing electric furnace, steel castings, by large foundry one hundred miles west of Chicago. Address Box 508, THE FOUNDRY, Cleveland.

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Man between 35 and 45 years old for executive position in steel castings company, capacity about 2000 tons a month. Manufacturers plain carbon and alloy steels, open hearth and electric furnaces. Should have engineering education and sufficient experience in foundry practice to cooperate with the President in forming and carrying out general organization and sales policies, and directly supervise sales. Address Box 516, THE FOUNDRY, Cleveland.

AGGRESSIVE MANUFACTURING COMPANY

Is looking for a mechanical engineer familiar with cost accounting work; one who is familiar with production methods, particularly pattern and foundry work, and should also have some knowledge of production welding. Give qualifications, references, and whether employed. Address Box 475, THE FOUNDRY, Cleveland.

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To take charge of small gray iron jobbing foundry in Michigan. Must be an all around man, able to produce A-1 castings, weighing from one pound to three tons. State age, experience and salary expected. Address Box 518, THE FOUNDRY, Cleveland.

WANTED

First class gray iron foundry superintendent. Must be thoroughly experienced in making automobile castings and patterns. No other need apply. Address Box 524, THE FOUNDRY, Cleveland.

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Experienced in the making of light and medium grey iron jobbing castings, by foundry located within radius of 100 miles from Cleveland. Only practical molder will be considered. State age, nationality, experience in molding and salary expected. Knowledge of metallurgy unnecessary. Excellent chance for advancement to anyone who can deliver results. Replies considered confidential. Address Box 481, THE FOUNDRY, Cleveland.

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Sales representative wanted in territories adjacent to Denver, Kansas City, Birmingham, Memphis, Jacksonville, Richmond, Toronto, Montreal, to sell complete line of nationally known and advertised foundry equipment. See Mr. Kidder at Space 367 Foundry Show, Detroit, or address The American Foundry Equipment Co., Mishawaka, Indiana.

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Assistant to superintendent steel foundry. An opportunity for young energetic man. Write giving age, experience and salary expected. Address Box 537, THE FOUNDRY, Cleveland.

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Age 43. Married. Protestant. Practical foundryman. Twenty-six years experience gray iron, nonferrous; sixteen years foreman, superintendent. Mix by analysis. McLain graduate. Good rigger. Now employed as superintendent. Available on short notice. Best references. Address Box 342, THE FOUNDRY, Cleveland.

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Thoroughly familiar with gray iron practice. Experienced on castings up to twelve tons. Mix by analysis. Know coremaking and molding, green or dry sand and can rig patterns for production. Can handle men to get largest production at lowest cost. Best references. Salary reasonable. Address Box 501, THE FOUNDRY, Cleveland.

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Age 37. Technical graduate. Molder by trade. A practical foundryman with eighteen years broad experience in general jobbing and production, producing quality gray iron castings in machinery, machine tool and automobile field. Well versed in all departments, molding, cupola, cores, rigging machines, etc. Wants to contact reliable firm in need of foundryman above the average in ability and person, as superintendent or assistant; offering good opportunity with future to one who can get results required. New England, the East or middle West. Address Box 517, THE FOUNDRY, Cleveland.

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Classified Ads

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With proven ability in the field of cast alloy steel specialties. College graduate and fourteen years progressive iron and steel foundry experience. Address Box 456, THE FOUNDRY, Cleveland.

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Desires connection as foreman. Excellent experience. Three years in Russia as foundry adviser. Salary secondary. A-1 references. Can be interviewed at Detroit Convention. Address Box 430, THE FOUNDRY, Cleveland.

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Wishes to locate with progressive foundry. Possesses exceptional ability, can handle men, and thoroughly acquainted with production methods on both automotive and jobbing work. Can furnish excellent references. Address Box 513, THE FOUNDRY, Cleveland.

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Wants to get located with a light and medium gray iron foundry. Good tradesman, executive ability and systematizer. Handle any class of men for production. Interview preferred. Address Box 523, THE FOUNDRY, Cleveland.

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With proven ability as estimator and producer of pattern equipment for large production and cheap one-casting patterns. Can handle large forces of men. Age 49. Thirty-two years experience. Address Box 544, THE FOUNDRY, Cleveland.

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Desires position. Steel, iron, ores, fluxes, fuels, slags, etc. Foundry experience. Address Box 549, THE FOUNDRY, Cleveland.

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Wide experience on large and small work. Metal experience. Work on bench or competent to take charge. Go anywhere. A-1 references. Address Box 552, THE FOUNDRY, Cleveland.

WOOD PATTERNMAKER

Would like position as foreman. Thirty-nine years old. Twenty-four years experience. Best references as to ability and character. Address Box 555, THE FOUNDRY, Cleveland.

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23 years experience light to medium jobbing and production. Specialized all types furnace work. Know molding, jolt machines, core making, technical and practical training. All around man. Capable, efficient, reliable. Interview requested. Address Box 231, THE FOUNDRY, Cleveland.

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Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, THE FOUNDRY, Cleveland.

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20-ft. Pulaski Vertical Boring and Turning Mill, two swivel heads on cross rail, table 12-ft. diameter; independent power raise and lower to cross rail; cross rail 36-inch wide, 27-ft. long, face of housings 27-inch; direct motor drive with a 40 H.P., 3/60/220 v. slip ring motor and control; all steel gearing; power feed throughout; maximum swing 20-ft. 4-inch; approximate weight 150,000 lbs.;

Beardsley & Piper Sand Slinger, No. 90014252 motor driven, portable;

60-inch Niles Boring Mill, two swivel heads on cross rail, 6-inch dia. ram, table 54-inch diameter by 5-inch thick, power feed to heads; **72-inch Niles,** single swivel head, table 54-inch wide by 4½-inch thick, 6-step cone, belt drive; **34-inch Rogers,** 30-inch chuck table, power feed, quick change gear, self-contained, motor drive;

42-inch Herman Pneumatic Car Wheel Type Bumper Molding Machine;

4-spindle Needham Automatic Reaming & Tapping Machine, 48-inch between housings, 2 heads on adjustable rail, 2-ft. adjustable side heads, table 30-inch x 9-ft., direct motor drive with a 15 H.P. Burke Motor, 3/60/220 Volt, 835 R.P.M., Complete with push button control starting equipment; **3-spindle A. W. Needham Reaming & Tapping Machine** for square screw nipple boiler sections, adjustable heads, vertical traverse 60-inch, horizontal traverse 36-inch, complete with taps and C/s;

2-ton Bessemer Steel Converter, side blow, with power tilting device with 15 H.P. Westinghouse motor, complete with No. 8 Sturtevant positive pressure blower, direct connected to 75 H.P. A.C. motor with relief valve and starter; **60-inch x 80-inch Herman** Pneumatic Jarring Machine, floor type, 72-inch Simpson Sand Grinder, 21-inch deep, wheels 32-inch x 6-inch; two-wheel type, belt drive.

CRANES—25-ton Cleveland Electric Traveling, two 12½-ton hoists on common trolley, four-motor type, 40-ft. span, build up girders, cab control, 30-ft. lift, A.C. motors; **10-ton Electric Traveling,** 36-ft. span, 15-ft. lift, 3-motor type, cab control, I-beam construction, A.C. motors; **7½-ton Pulaski Electric,** hand travel to trolley, electric hoist and long travel, 30-ft. span, 2-motor type, I-beam construction, 18-ft. lift, A.C. motors.

5-ft. Cincinnati Bickford Plain, fully enclosed head, triple geared, tap. att., serial number 3039; S.P.B.D. through gear box.

PLANERS—72-inch x 72-inch x 12-ft. Bement Miles Planer, 2 heads, on cross rail, 2 side heads, table 60-inch wide, 5½-inch thick, belt drive with C/s.

30-inch x 30-inch x 8-ft. Betts Planer, one head on cross rail, table 26-inch wide x 4-inch thick, 4-inch oil pocket, 3 T-slots, distance between "V's" 15-inch; arranged for self-contained motor drive with 7½ H.P. G.E. motors 3/60/220 v.

LATHES—18-inch x 10-ft. Lodge & Shipley Geared Head, q.c.g., d.b.g., with tap att. 16-inch four-jaw Independent chuck. **24-inch x 12-ft. Boye & Emmes,** 90-inch between centers, single back gear, 4-step cone, belt drive. **14-inch x 10-ft. Flather,** q.c.g., s.b.g. distance between centers 82-inch, with tap. att. chuck, steady rest. **20-inch x 18-ft. Lodge & Shipley,** patent head, tap. att., q.c.g., with chuck and face plate. **27-inch x 20 ft. American Engine,** q.c.g., s.b.g., 2¼-inch hole in spindle, tap. att., 15-ft. bet. centers, 4-step cone, chuck, face plate, steady rest, serial number 42321. **34-inch x 14-ft. New Haven,** s.b.g., p.c.g., 5-step cone, b.d. chuck, steady rest. **40-inch x 18-ft. Pittsburgh Heavy Duty Engine,** raising blocks to swing 60-inch; triple geared, internal face plate drive; q.c.g.; 54-inch face plate.

Also complete stock room, consisting of large assortment of steel, bolts, nuts, drills, milling cutters, etc. Also complete office. A complete catalogue will be sent you free upon request. Send for your copy now!

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Foundries For Sale

FOR SALE

Brass and aluminum foundry, Omaha district. Fisher furnace oil burner, 60 to 80 crucible. Aluminum furnace oil and other necessary equipment. $500 f.o.b. Address Box 520, THE FOUNDRY, Cleveland.

FOR SALE

Small iron foundry, doing fair business; steel and brick construction lot 150 x 300, trackage; desirably located for light or heavy work; must sell to close estate. For further information address E. P. Stary, 804 19th Avenue, S. W., Cedar Rapids, Iowa.

FOUNDRIES FOR SALE

Practically new stove foundry, 42,000 sq. ft. with assembly buildings, $25,000. Small jobbing iron foundry, $16,000. Pennsylvania foundry 38,000 sq. ft., 15 ton crane, good buildings, very cheap. EDWARD H. ZOLL, 196 Market St., Newark, N. J.

For Sale

FOR SALE

Davenport jolt rollover draw moulding machines, Tabor squeezers, crane ladles, cast iron flasks and snap bands. Not a dealer. P. O. Box 154, Quincy, Illinois.

FOR SALE

American 6-ft. Type "K" Sandcutter with 20 H.P. Buda Gas Motor. Good working condition. Bargain price for quick purchase, cash and easy terms. Address Box 458, THE FOUNDRY, Cleveland.

ALUMINUM FURNACE

Firebrick lining, almost new condition. Shell 34 inches diameter, 36 inches high, 17 inch iron pot. Has oil or gas burner. Address Box 487, THE FOUNDRY, Cleveland.

FOR SALE

Rebuilt type No. V-5 and V-5½ GREENE FURNACES. Good as new. Advise power supply information for prices. GREENE ELECTRIC FURNACE COMPANY, 2931 FIRST AVENUE, SOUTH, SEATTLE, WASH.

For Sale

FOR SALE

Two (2) 20-ton Worm Gear Ladles 52½-inch I. D. x 52½-inch deep. A-1 Condition. Price—$250 each.

J. A. DOUGHERTY
32 Meadowbrook Ave.,
Llanerch, Penna.

FOR SALE

1—Nicholls 24-inch x 54-inch jolt, squeeze, stripp 6-inch draw.
1—Tabor 18-inch x 40-inch shockless jolt, squeeze, stripp 6-inch draw.
2—Osborn 403 roll over.
1—Sand elevator 40-ft. high 10-inch belt 4-inch x 7-inch buckets motor drive. Also double sand bin with duplex gate.

All in A-1 condition.
Address Box 529, THE FOUNDRY, Cleveland.

FOR SALE

2—15-ton Heroult electric furnaces.
2—Whiting 108-inch diameter cupolas.
2—2-ton converters.
4—5-ton Euclid monorail hoists.
1—32.2 cu. ft. blower with 150 H. P. Westinghouse AC Motor.
1—No. 5½ Root Blower with 75 H. P. Westinghouse AC Motor.

NATIONAL MALLEABLE & STEEL CASTING CO.
GENERAL PURCHASING DEPARTMENT
CLEVELAND, OHIO

FOR SALE

48-inch New Haven direct pressure sand blast barrel with 12 x 12 Curtis 2-cylinder compressor and motor. All good as new. BELCHER MALLEABLE IRON COMPANY, EASTON, MASS.

COMPLETE BOUND VOLUMES OF "FOUNDRY" from 1899 to 1907 inclusive, good condition, make offer. Address Box 525, THE FOUNDRY, Cleveland.

CLASSIFIED RATES

Position Wanted advertisements: minimum ad 30 words, $1.50, additional words 5c each.

Help Wanted advertisements; minimum ad, 50 words $3.00; additional words 6c each.

For Sale, Wanted and Miscellaneous advertisements 10c per word, minimum advertisement $3.00.

Reduced rates for three or more insertions.

First line is set in bold face type. A box address counts as six words.

For Sale

BIGGER BARGAINS THAN EVER

Furnaces, Cupolas, Blowers, Exhausters, Compressors, Mold Machines, Tumblers, Hoists, Core Machines, Mixers, Motors, Power Equipment, Etc. Hundreds in stock, 20 years fair dealing with the foundries. Tell us your needs for better production and money savers.

Clifton Machinery Co.
1023 W. 6th St.
Cincinnati, Ohio

MOLDING MACHINES

1 International Type F 36 x 16" draw, comb. jar ramming, power turn-over power draw, 3600 lbs. cap. @ 80 lbs. pressure.
1 No. 403 Osborn jolt roll-over pattern draw flask cap. 44 x 36"—12" draw 1400 lbs. cap. @ 80 lbs. pressure, with swingout mold table, power roll-over.
1 No. 403-W Osborn jolt roll-over pattern draw, 52 x 36"—12" draw 1300 lbs. cap. @ 80 lbs. pressure jolt cyl. dia. 8" with swing-out Mold Table, power roll-over.
1 No. 20 Davenport portable jolt roll-over pattern draw, 19 x 31" flask cap. 6" draw, 500 lbs. cap. @ 80 lbs. pressure.
3 No. 832 Milwaukee hand jolt and roll-over, foot draw, portable, 8" pattern draw, 15 x 32" table.
3 No. 703-5 Osborn jolt squeeze and strip, length of opening in lifting frame 34", 6" pattern draw, 1000 lbs. jolting cap. flask length 44½"—roll-off conveyor.

SAND CUTTERS

1 Cleveland 4 motor Sandcutter 80" cutting blade 8½ ft. between tractor wheels, Cleveland Motors all 440 V AC.
1 American Heavy Duty Wide Cutting Type "K" 84" cutting blade 96" between tractor wheels, equipped with Buda Gas Engine.

MISCELLANEOUS

1 No. 2—6 ft. dia. Pan Simpson Core Sand Mixer, pulley drive, with Simpson Loader.
1 Gardner No. 24 horizontal Disc Grinder. 53" dia. disc—on bed plate.
1 Hayward 2 yd. Clamshell Material Handling Bucket—with 10 HP 220V DC RPM Motor.
1 Tyler Hum-Mer Electric Screen Type 31, 3 ft. wide—arranged for 30° screening angle with electric vibrator-motor generator.
1 1-ton Shepard Lift-A-Bout Hoist with 110V DC Motor, floor operated.

Our LATE LIST No. 64 contains COMPLETE STOCK OF Fdry. Eqpt. Bargains on hand at our warehouse ready for prompt delivery

SCULLY-JONES & COMPANY
19th & Rockwell St. Chicago, Ill.

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